AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 29 FEBRUARY, 1946 NUMBER 2

TECHNICAL REFINEMENTS IN THE REMOVAL OF MAGNETIC FOREIGN BODIES FROM THE POSTERIOR SEGMENT OF THE EYE*

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It is not the purpose of this paper to discuss the advantages or disadvantages of posterior-route extraction of metallic foreign bodies as compared to the anterior route. All authorities will agree that, in many instances, removal of foreign bodies by the posterior approach is essential. The surgical technique, experimental data, and clinical reports to be presented were for the most part accomplished with the small hand magnet.† The reason for this was twofold: 1. This particular magnet is the standard item of issue in Army hospitals.‡ 2. This magnet is of the type and size in the possession of most ophthalmologists.

The military ophthalmologist has had occasion to see many patients with retained intraocular foreign bodies. In the majority of cases, our experience has shown these retained fragments to be very small, usually 1 mm. or less in size. This was in part due to the following factors: 1. The larger particles had been removed overseas. 2. Many of the eyes receiving penetrating injuries by larger fragments had been destroyed or so seriously damaged they had been enucleated before the patient arrived at the Eye Surgical Center in the Zone of the Interior.

Some of these very tiny fragments were picked up by the use of specialized X-ray techniques. Recently we had two or three cases in which a very small particle could be seen with the ophthalmoscope floating free in the vitreous, although the most painstaking X-ray technique showed no foreign body whatsoever. Such minute particles, if magnetic, can be successfully removed.

The retained intraocular metallic foreign bodies encountered in the majority of cases seen in an Eye Surgical Center, have been present from two weeks to two or three months—not because the diagnosis has been missed, but rather because the patient had incurred other multiple serious wounds threatening to life for which other major surgical procedures had, of necessity, been required. Some of these eyes required immediate enucleation. Many, however, were in good condition. It was not unusual to find an eye with single or multiple retained intraocular foreign bodies with a vision of 20/20 and very little or almost no ocular reaction present. This is not surprising

* From the Eye Surgical Center, Crile General Hospital.

† Lancaster model with foot switch.

‡ Giant magnets are also available in Army Eye Surgical Centers.

when one considers that these patients received the attention of a well-qualified ophthalmologist almost from the first hour of the original injury. Any necessary emergency eye surgery had been accomplished immediately, with careful follow up of the case through the chain of evacuation.

In September, 1942, one of us* reported an aid in the precise localization of metallic foreign bodies embedded in the choroid and retina. In this case an officer patient was found to have a 1 by 1 by 1-mm. retained metallic foreign body embedded in the choroid and retina of the left eye, 4½ mm. from the optic disc, in the superior nasal quadrant. The vision of the eye was 20/20. The vitreous was clear except for a few red blood cells, and very little local ocular reaction was present. The injury had been incurred five days prior to the time first seen. Because the eye became irritable and photophobic, with an increasing number of cells in the anterior segment and vitreous, the removal of the particle was thought to be imperative. The operative approach in this case called for a pinpoint localization in order to make the scleral incision directly over the retained fragment. It was believed that such an approach was indicated to prevent lateral drag on the choroid or retina, as would have been the case had the magnet been applied at a point on either side of the fragment. At the time of surgery a previously prepared lead marker affixed to an ordinary black-silk suture was sewn to the sclera at the point indicated by the X-ray localization.

The internal rectus muscle, which had been detached, was reattached with one suture and a PA and a lateral X-ray film was made in the operating room with the portable X-ray machine. It was evident from the PA film that the foreign body had been missed 4 mm. in the vertical plane, and from the horizonal film that an error of 3 mm. in the anterior-posterior direction had been made. It was a simple matter to make the correction indicated from the known location of the lead marker and to cut down directly upon the foreign body, which was removed on the first application of a small hand magnet. Convalescence in this case was uneventful, with no evidence of vitreous hemorrhage, further damage to the retina or choroid, or late sequelae. Following this experience it became our custom to utilize a lead marker on the sclera in the majority of those cases wherein a posterior approach was indicated. This was in no way a reflection on the ability of the roentgenologist who had performed the localization. As a matter of fact, in our experience, it is often extremely difficult to mark on the sclera the exact site of the X-ray localization of the foreign body. This is due, in part, to the difficulty of picking the exact meridian indicated, and is especially true if the fragment is far posterior, and when the globe must be strongly pulled to one side. We have also found this aid in localization of great value in those cases in which the exact position of the particle was in doubt. We refer especially to those instances wherein repeated localizations may possibly vary, by one or two millimeters, but wherein this error may place the particle either in or out of the globe. Such a marker can be quickly and easily fashioned by shaving a piece of lead with a sharp knife so as to secure a fragment approximately 2½ by 2 mm. in size. This lead fragment is fastened around and pinched on to a silk suture attached to a scleral needle. In any case the size of the marker should be distinctive and of a size differing from that of the retained intraocular foreign

* Gilbert C. Struble, read before the Indianapolis Ophthalmological Society.

body so that no confusion will arise in viewing the film taken in surgery with the portable machine as to which is the marker and which is the foreign body.

Such a procedure will, to some extent, prolong the operating time. This can, however, be kept to a minimum if a portable X-ray machine is available when needed and if rapid developer solution is used. Some additional minutes are lost in redraping the patient following the taking of the X-ray pictures during the operation, but we have found the procedure well worth the time required.

For a time we experienced difficulty in maintaining the sterility of sutures and needles attached to a resected ocular muscle during the taking of the additional films. This difficulty was solved by placing the sutures in a sterile test tube anchored to the upper lip and below the nose with a strip of adhesive plaster. Sterility of the field is maintained by placing the cassette under a sterile towel.

At the present time we have added other steps to this procedure, some of which are original and some a variation of other methods. Lancaster[1] described a modern diascleral method of extraction of foreign bodies. He advocated a scleral incision by layers with the diathermy knife, to avoid hemorrhage. He described the application of the tip of the hand magnet to the incision with extraction of the foreign body without entering the vitreous. He states the cutting current of the diathermy knife should not be allowed to act on the vitreous but does not state whether the uvea is actually penetrated and included in the section with the knife.

Verhoeff[2] advocates a careful scleral section under a conjunctival flap 5 to 6 mm. from the limbus and parallel to the ora serrata. He used a large knife needle, the point of which had been filed off. A careful dissection down to the ciliary body is made, great care being taken not to penetrate this tissue with the knife. The tip of the large hand magnet is applied to the operative wound so as to pull the fragment through the ciliary body. Verhoeff states that if the foreign body is small a small cut in the ciliary body may be required to facilitate its delivery.

The following technique has, in our hands, been so uniformly successful that we feel it is worth describing in sequence.

I. PINPOINT LOCALIZATION OF THE FOREIGN BODY AS AFOREDESCRIBED. (figs. 1-6). This is essential where the foreign body is embedded in the choroid and retina: (a) To prevent lateral drag on the choroid and retina, or grooving and guttering of these layers when removal of the foreign body is attempted from one side or the other. (b) To keep choroidal or retinal bleeding to a minimum or prevent it entirely. (c) To reduce postoperative reaction and prevent late sequelae such as retinitis proliferans and retinal detachment.

II. FIXATION OF THE GLOBE, BY SCLERAL SILK SUTURES. ONE ON EITHER SIDE OF THE SCLERAL SECTION. The following advantages have been experienced: (a) Complete control of the operative area is maintained constantly. (b) Any desired amount of traction on the lips of the scleral section can be maintained during the section without instrument manipulation of the margins of the incision, and the attendant danger of nicking or penetrating the choroid or ciliary body, which is to be avoided at all cost. (c) Any desired degree of scleral separation can be maintained during the extraction of the foreign body without the use of instruments, and the operative site can be guided to the tip of the gaint magnet on those rare occasions when such an instrument is needed. (d) The sutures

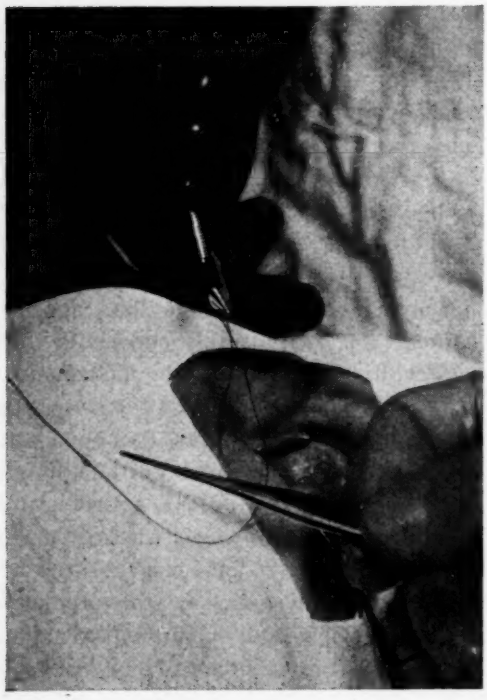


Fig. 1 (Struble and Croll). Tip of fixation forceps indicates the lead plate on a No. 6-0 black-silk suture.

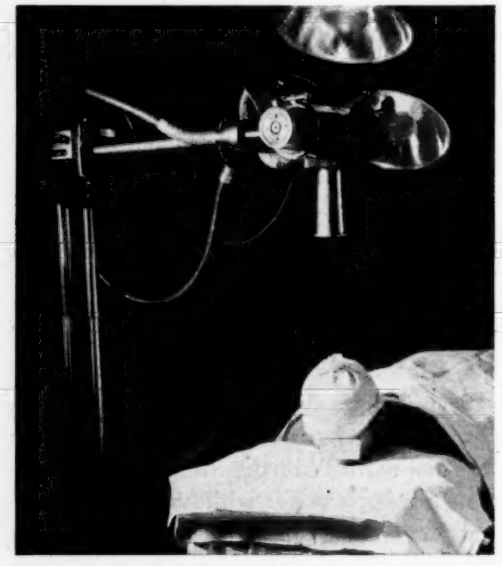


Fig. 2 (Struble and Croll). Posterior-anterior position. The cassette is under a sterile towel.

are available and ready as additional supporting sutures if desired for closing the sclerotomy incision, and as a guide suture during the application of the diathermy barrage.

III. THE SCLERAL SECTION. Using a loup, a brilliant source of light, and a cataract knife, we make a 6-mm. scleral

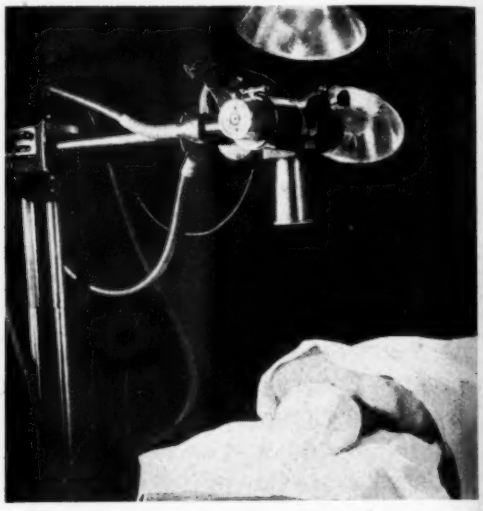


Fig. 3 (Struble and Croll). Lateral position. The cassette is under a sterile towel.

section between the scleral retraction sutures (see II). The sclera is carefully divided by layers until approximately four fifths of the thickness of the sclera has been traversed. At this point a doubled-armed, 000 plain catgut mattress suture is placed through one side of the scleral incision, involving one half of the thickness of the sclera. These sutures are carried through the opposite lip of the section and through the outer one half of the thickness of the sclera. One tie is made in the suture, which is left loose and drawn away from the site of the incision. This suture is for later approximation of the scleral section after the foreign body has been removed. The incision is now completed down to the choroid, or pars plana of the ciliary body,

great care having been exercised not to perforate or penetrate the uvea. By lateral traction on the scleral lips with the retraction sutures, this dissection is accomplished with reasonable care, and is continued until all of the scleral fibers overlying the uvea are completely cut through. We have found that as soon as a small black glistening uveal bead presents in the section the remainder of the uveal exposure can be facilitated by inserting the blunt tip of a pair of conjunctival scissors and dividing the few remaining scleral fibers with a single cut. The blunt back side of the lower blade of the scissors is used to push the uvea away from the scissors tips.

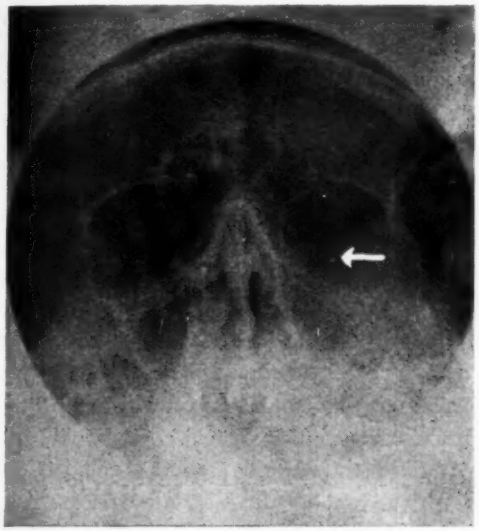


Fig. 4. (Struble and Croll). Posterior-anterior view, showing the metallic foreign body in the left eyeball.

The section is now complete. Any bleeding encountered during this dissection is readily controlled by coagulation of the vessel with the diathermy tip, which should always be available both for the purpose of hemostasis and later for the diathermy barrage around the operative site, when indicated. At this step of the procedure a black bead of choroid (or ciliary body, if the pars-plana route is being used) presents between the margins of the incision. When the approach is made posteriorly over the choroid, the scleral section should be made in the antero-posterior meridian. When the pars-plana approach over the ciliary body is utilized the section should be made from

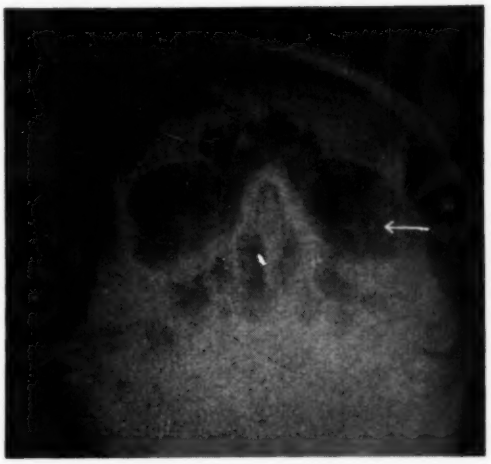


Fig. 5 (Struble and Croll). The arrow indicates the lead marker and an error of 6 mm. in the lateral meridian.

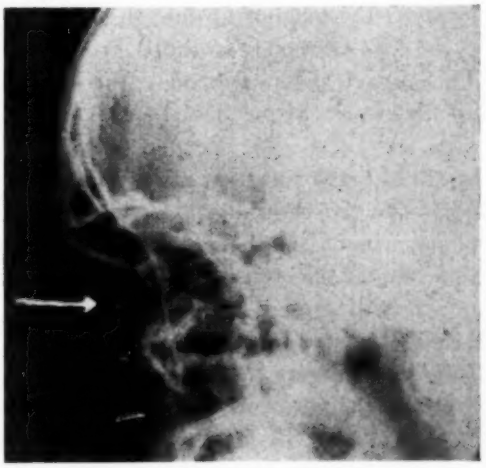


Fig. 6 (Struble and Croll). The arrow indicates the retained intraocular foreign body and the lead-plate marker. There is less than 1 mm. of error in the vertical measurement.

6 to 8 mm. from the limbus, concentrically, and parallel with the ora serrata.

IV. Removal of the intraocular foreign body without penetrating the choroid or the pars plana of the ciliary body with the magnet tip. The broad tip of the small hand magnet is placed in contact with the uvea. This particular tip was especially designed by Lancaster[3] to give the strongest possible pull on a fragment at a distance. "The blunter and shorter the pole, the stronger the pull when tested at 20 mm. or more."

It has been found that the 6-mm. incision that has just been described is adequate, so that a considerable area of the magnet tip is in contact with the surface of the uvea. The foot switch is now closed and the foreign body drawn through the retina and choroid, or the pars plana of the ciliary body. This is possible because of the well-known fact that a metallic foreign body always approaches the magnet point first. It, therefore, acts as its own perforator and will emerge through the intervening tissues, making the smallest opening compatible with its size. In no event is it necessary to insert the magnet tip into the vitreous, even for extremely minute fragments. This is well demonstrated in the experimental work to be described. Particles over 0.5 mm. in size, if accurately localized, have sufficient impact cleanly to perforate the choroid and retina or pars plana, usually on the first application of the magnet. Foreign bodies 0.25 mm. in size will present beneath the uvea but usually require a small nick in the uvea for their delivery. We believe that there are many advantages in not entering the vitreous with the magnet. The risk of infection is reduced to a minimum, and intraocular hemorrhage with the resultant formation of vitreous bands and late retinal detachment is also reduced to a minimum or prevented entirely. We feel we can safely explore or attempt the surgical removal of fragments which have some indication of being very poorly, if at all, magnetic, and that we can assure the patient in advance that should removal prove unsuccessful his eye will have in no way been injured. This is especially important should the eye be quiet, the vision normal or nearly so, and where the foreign body appears to be aluminum, plastic, or some other substance well tolerated by the eye.

V. Closure of the scleral incision. Following removal of the foreign body the mattress catgut suture, previously placed, is tied. This securely approximates the scleral margins. The silk retraction sutures on either side of the section are now removed or they may be tied together over the section as a supporting suture. They may temporarily be left uncut to act as a guide suture to be used in manipulating the globe during the last procedure; namely,

VI. The diathermy barrage around the operative site. Since the retina is in contact with the choroid, we have carried this barrage through only the outer two thirds of the sclera so as not to injure the underlying retina with the diathermy tip. If desired, surface scleral coagulation with the small ball electrode may be substituted, but care must be taken not to burn the sutures.

Experimental

Foreign bodies free in the vitreous

In following these six steps, and using precise localizations with the lead-plate technique, it began to appear that almost all magnetic foreign bodies encountered in clinical work could be successfully removed with the small hand magnet alone. This included particles even as small as 0.25 mm. in diameter, provided the particle was within the "certain or critical zone" for its particular size. Obviously

a 0.25-mm. fragment, lying in the center of the vitreous 10 or 11 mm. away, cannot be reached with the hand magnet but may be reached with the giant magnet. We were, however, being confronted with an increasing number of foreign bodies free in the vitreous. It was felt that when possible, it was advantageous to remove these particles through the pars-plana approach instead of through a posterior sclerotomy over the choroid. This approach has the additional advantage that no penetration of the retina by the foreign body occurs, and for this reason any possibility of late detachment of the retina is reduced to a minimum. Immediately there arose the question as to what distances various-sized particles could be drawn through the vitreous and through the scleral incision.

The experimental work was performed with the use of particles of steel shavings measuring 1 mm., 0.5 mm. and 0.25 mm. in diameter, since these were the sizes most often encountered clinically. The work was carried out on eyes of freshly killed hogs, less than 12 hours dead, which were kept refrigerated until used. The small hand magnet with foot switch was used in all the experimental work for the reasons mentioned earlier in this paper. It is realized that many factors exist in these experiments not present in the injured human eye.

First the retina of the hog appears to be slightly thicker than that of man. Second, no organizing exudate, fibrin, or hemorrhage exists in the experimental specimens.

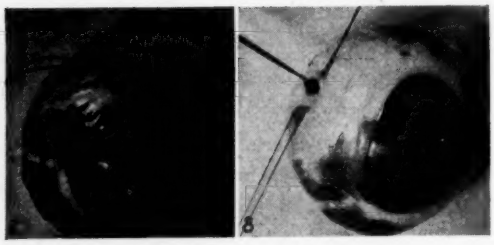
The vitreous in the fresh hog eyes grossly seemed to be of the same consistency as that of the human eye and was probably a negligible factor in error. Grossly, the choroid in the hog and human eye appeared to be almost identical in consistency and thickness.

The experiments were carried out as follows: Scleral retraction sutures were placed as previously described about three sixteenths of an inch apart, and a scleral incision by layer dissection was made between the sutures down to the ciliary body or the choroid until the usual black bead presented. These sutures were then tied with one double tie so as effectively to close the incision temporarily during sectioning of the globe.

The eye was then turned on its side, and with a sharp cataract knife the entire anterior segment of the eyeball was cleanly and quickly excised on a plane just behind the iris. It was found that by utilizing a sharp knife and rapid section a negligible loss of vitreous occurred. The sectioned eye was again placed upright in the manikin, cut surface uppermost. The scleral silk sutures were untied, exposing the uveal bead as before.

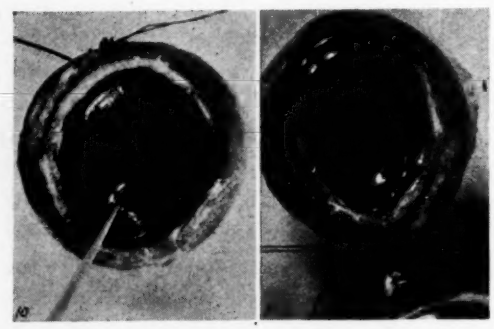
The previously chosen, measured, and weighed metallic fragment was then inserted into the vitreous at varying distances from the scleral section, beginning on the side of the eye opposite the section. The blunt tip of the small hand magnet was applied in contact with the uveal bead and 10 consecutive tries for the foreign body were made; each consisted of five seconds' duration. In cases of failure the foreign body was removed from the vitreous and moved closer to the point of sclerotomy and another attempt at removal made. The distance in millimeters from the foreign body to the scleral section was carefully measured on each occasion prior to attempted removal. In each instance the foreign body was placed in the vitreous at a depth corresponding to that of the scleral section so that a straight pull with the magnet could be made on each occasion (figs 7-11).

The direct observation of metal particles in the vitreous under magnetic attraction proved to be very interesting. The foreign body would move toward the



Figs. 7 and 8 (Struble and Croll). Experimental specimens. Fig. 7 shows scleral retraction sutures of No. 6-0 black silk in position. Fig. 8 shows scleral section completed. Black bead of choroid presenting.

Fig 9 (Struble and Croll). Experimental specimen. Removal of the anterior segment of the globe.



Figs. 10 and 11 (Struble and Croll). Experimental specimens. Fig. 10 shows the metallic foreign body being introduced into the vitreous. The reflexes represent high lights on the vitreous. Fig. 11 shows the foreign body emerging through the choroid. The magnet tip is held at a distance from the incision to demonstrate this to better advantage.

magnet to some degree, regardless of the distance involved. When the distance was too great for removal it would at once return to its original position when the foot switch of the magnet was released. In some instances, following 10 magnet applications, the final resting position of the foreign body would be a little closer than it was in the beginning, but in most cases it would come to rest in its original position. The experimental data accumulated in this work are tabulated in the three graphs (figs. 12-14). Each graph has been divided into three zones: first, a "certain zone" representing that distance at which the foreign body was always secured on the first attempt at removal; second, a "critical zone," where the fragment was secured following multiple applications; third, a "failure zone," representing that distance at which removal was impossible. The "certain" and "critical" zones for each sized particle were plotted on schematic eyes. These zones represent those distances at which particles of this size, free floating in the vitreous, can be consistently removed by the use of the pars-plana approach. The distances illustrated can likewise be applied to the posterior approach over the choroid. This route would be indicated in those cases wherein the given-sized fragment occupies a position far posterior in the vitreous. In such a case it may no longer fall within the "certain" or "critical zone" whence removal is possible by using a pars-plana approach.

On many occasions when the foreign body was under direct observation in the "critical zone" it was noted that it would at times appear almost to touch or "nudge" the retina during the application of the magnet and then return to its original position as the foot switch was released. With the foreign body in the "certain zone" it appeared that the success

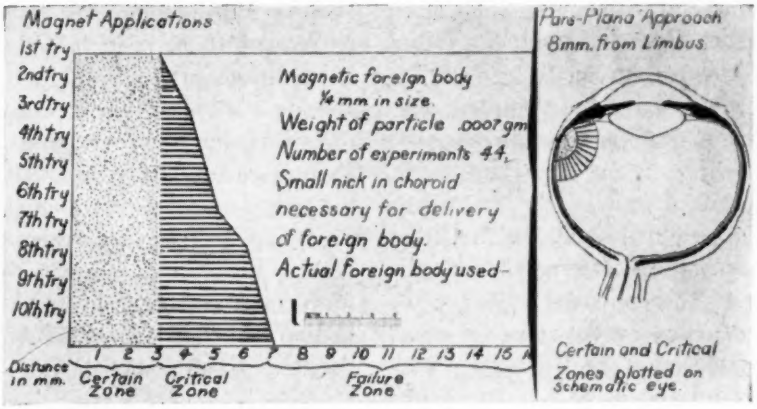


Fig. 12 (Struble and Croll). "Certain, critical, and failure zones" for magnetic fragment 0.25 mm. in size.

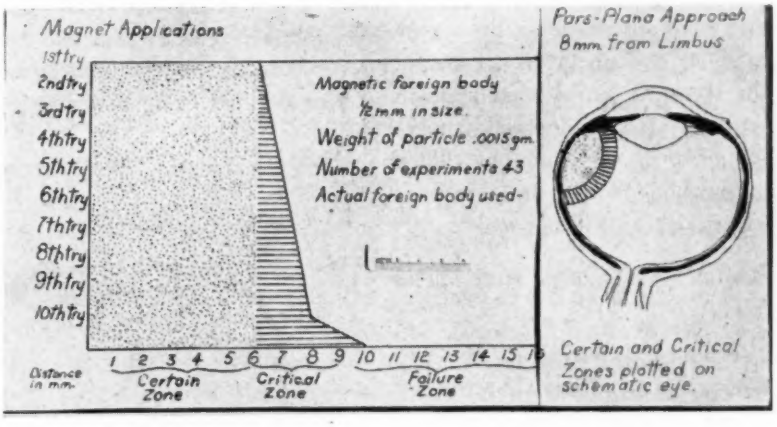


Fig. 13 (Struble and Croll). "Certain, critical, and failure zones" for magnetic fragment 0.5 mm. in size.

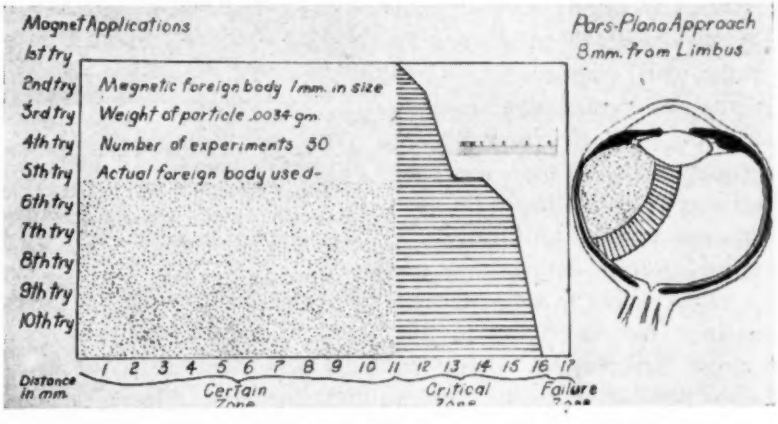


Fig. 14 (Struble and Croll). "Certain, critical, and failure zones" for magnetic fragment 1 mm. in size.

of the extraction on the first application of the magnet depended upon the initial impact of the foreign body against the retina and choroid and not upon any subsequent drag or pull on these membranes. This, we believe, is an important point, for the portal of exit of the fragments was very minute; so small, in fact, that it could not be seen afterward with the unaided eye and no late evidence of tension or traction on the uvea or retina could be made out. The 0.5- and 1-mm. fragment could always be delivered without difficulty. The 0.25-mm. fragments, apparently, as a result of their very small size and lack of impact, had to be aided in their path through the uvea by a very small nick with the tip of the cataract knife at the time they presented beneath these structures. In no instances were these fragments sharply pointed. They were, as a matter of fact, small square or oblong particles with blunt ends.

Foreign bodies embedded in the retina and choroid

In this series of experiments the hog eyes were prepared as before. The foreign body, however, instead of being planted free in the vitreous was now embedded in the choroid and retina at varying distances from the scleral section, and efforts at removal with the magnet were repeated in the usual manner. The series of experiments was inconclusive in so far as the ability to remove the foreign body at distances greater than 4 mm. was concerned. This was probably due to the fact that the fragment was not uniformly embedded in the choroid, retina, and the inner layer of the sclera in all instances.

One consistent fact stood out in this series. In those experiments where the fragment was pulled laterally for a distance of 3 or 4 mm. toward the sclerotomy opening and magnet, a tear or gutter of the retina or choroid was created throughout the length of the movement of the particle.

In those cases, however, where the foreign body was embedded in the choroid or retina directly overlying the scleral opening, it was always pulled through by the magnet on the first attempt with a minimum of trauma to these layers. We feel this is another argument for precise pinpoint localization of metallic foreign bodies embedded in these structures at the time of surgical removal.

Clinical observations

In the schematic eye represented below multiple metallic foreign bodies of indicated size are shown at the distances and in the zones in which their removal was accomplished. The diagram shows those foreign bodies removed over a three-months' period (fig. 15).

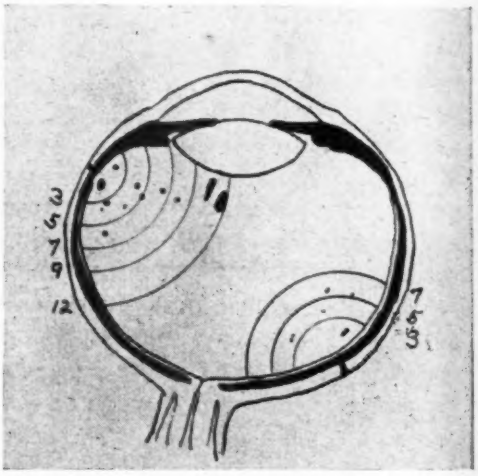


Fig. 15 (Struble and Croll). Schematic eye showing distances in millimeters in which metallic foreign bodies have been removed clinically. In no instance has the magnet tip penetrated the uvea.

Those cases listed as pars-plana approaches and scleral sections over the choroid are grouped separately. These distances have been measured from lead-plate localizations made during the opera-

tive removal of the fragment. All of these particles were removed with the small hand magnet with a single exception. In this one instance a very minute metal fragment less than 0.25 mm. in size was localized and could be seen immediately behind the lens in the exact center of the globe. It was obviously outside the "certain or critical zones" for particles of its size. Repeated applications of the hand magnet produced no results. It was removed by a prolonged exposure (about three minutes) to the giant magnet.

In one case we misjudged the size of a fragment floating in the posterior vitreous and attempted to pull it forward through a pars-plana approach. The particle was so small it could not be visualized by the X-ray. We were unsuccessful both with the hand and the giant magnet. A posterior approach 10 mm. farther back over the choroid (and 10 mm. closer to the particle) resulted in prompt recovery of the fragment on the first application of the hand magnet. In every instance removal was accomplished without uveal penetration with the magnet tip. No instance of retinal separation, postoperative infection, or vitreous hemorrhage has occurred to date.

Conclusions

1. A method of pinpoint localization of metallic foreign bodies in the eyeball, using a small lead plate sewn to the sclera, has been presented.

2. The removal of magnetic foreign bodies in the posterior segment of the globe can be accomplished without penetrating the choroid or pars-plana with the magnet tip.

The success of this procedure depends on the following factors: (a). Pinpoint localization of the foreign body. (b). A painstaking layer dissection of the sclera between scleral retraction sutures until the black uveal bead presents in the section.

3. A simple method for fixation of the globe during the scleral section and removal of the foreign body has been described, together with a simple suture for closing the incision after the operation has been completed.

4. Retained intraocular magnetic foreign bodies down to and including particles 0.25 mm. in size can be consistently removed with the hand magnet, provided: (a) The foreign body has been accurately localized. (b) The fragment lies within the proper zone of action of the magnet.

5. Many cases of metallic foreign bodies free floating in the vitreous can be removed through a pars-plana approach providing the particles lie in the "certain" or "critical" zone as herein determined for its size and weight.

6. By referring to the tables and knowing the size of the magnetic foreign body in advance from the X-ray localization, the operator can choose with a considerable degree of assurance which operative approach will most likely give successful results.

Acknowledgement is made of the valuable assistance of Capt. Lewis N. Rudin (MC), and Technical Sergeant R. H. Wagner of the Photographic Laboratory, Crile General Hospital, and to Capt. Carl A. Hamann (MC), for the photographs in this report.

References

[1] Lancaster, W. B. The technique of extraction of intraocular foreign bodies. Amer. Jour. Surg., New series, 1938, v. 42, Oct., no. 1, pp. 14-24.
[2] Verhoeff, F. H. Concerning magnetic intraocular foreign bodies. Amer. Jour. Ophth., 1932, v. 15, Aug., p. 685.
[3] Lancaster, W. B. Stronger eye magnets. Trans. Amer. Ophth. Soc., 1915, v. 14, pt. 1, p. 174.

THE OCULAR COMPLICATIONS OF LEPROSY*

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Traditionally, leprosy is dreaded as probably the most disfiguring of all diseases. It is also true, but not so generally recognized, that leprosy has a higher percentage of ocular involvement than any other systemic infection. When the threat of blindness is added to the patient's natural dread of the disease, the condition is indeed terrifying.

Tuberculosis, focal infection, syphilis, and other infections often involve the eye, but the ocular lesion of such infections is relatively limited as compared with that of leprosy, even if we accept the lowest statistics as given by the various authorities. The statistics of the percentage of eye involvement vary greatly in the reports of various leprologists. This variation is easily understood in view of the following conditions: (1) Variation of the forms of leprosy in different localities, the benign forms being prevalent in some places and the malignant in others; (2) difference of opinion as to what constitutes an ocular complication for statistical purposes, a mere conjunctival hyperemia being sufficient for one investigation while only well-defined, typical lesions are included by another; (3) available diagnostic procedures, an examination by an ophthalmologist with a slitlamp would reveal a much higher percentage of involvement than an observation by a general physician with a loupe; and (4) duration of the disease, it being obvious that the ocular involvement would be higher in the advanced cases.

In addition to these factors, there has always been difficulty in reconciling the data of various investigations because of a lack of a clear classification of the various types of leprosy. Different criteria have been used, and numerous classifications have been advanced, but none has proved entirely satisfactory. For years the Bacillus leprae (Hansen) has been accepted as the etiologic agent of leprosy, but the classification continues to be clinical and topographical. As late as 1931, at the Congress of Manila, the lesions were spoken of as a cutaneous type, which was very malignant with many bacilli, and a nervous type, which was relatively benign. Even at that time there was another well-recognized separate form, the tuberculoid type, that could not be placed in the foregoing classification. The Congress of Cairo (March, 1938) made an attempt to remedy this by accepting two primary types—the lepromatous and the nervous with the tuberculoid as a subdivision of the latter. Although this classification is based on criteria partially histopathologic, in many ways it does not clearly define the nervous type.

Recently a number of South American leprologists set up a new classification in which there are three fundamental types: the lepromatous, the tuberculoid, and a third intermediate form called the non-characteristic for lack of a better name. The tuberculoid type is benign, with very few organisms, whose prognosis is generally good inasmuch as many lesions tend to regress spontaneously. The lepromatous type is malignant, with many bacilli, and tends to involve the entire system including the eyes. The non-characteristic form tends to evolve toward one or the other of the two former types,

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* A condensation of the report presented at the Pan-American Congress of Ophthalmology in Cleveland, 1941. The original paper was illustrated with 51 figures.

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possibly being a type that will disappear when its characteristic features become better known. This classification is fundamentally histopathologic. It is difficult to use, but with experience may be applied to the great majority of cases. In doubtful instances, laboratory procedures will probably be sufficient to establish the exact diagnosis. With the use of this classification many inconsistencies disappear, particularly in the matter of prognosis and as to probabilities of ocular involvement.

I have had the opportunity to collect a series of 1,279 cases of leprosy classified on this basis. All of these cases have been under my own careful observation and have been examined with the slitlamp at least once a year, many of them oftener if the lesion were mild or progressive. This series tends to show not only the value of this classification but it also gives some definite figures as to the involvement of the various ocular tissues in the different types. Before the results of this study are given, a discussion of the common ocular lesions of leprosy should be presented to aid in a better and more complete understanding of these cases.

Ocular lesions of leprosy

Extraocular involvement. The involvement of the skin of the brow and cheeks is very common in leprosy. The spread of these lesions into the eyelids is important to the ophthalmologists, for the lesions form an abundant source of organisms for direct invasion of the eye.

The lepromatous lesions have a predilection for the ciliary margin, more often than for the upper lid. They may be small and delimited or form large masses involving the entire ciliary portion of the lid. The tuberculoid lesions are common in the ocular region, often extending into the eyelids. This type of lesion, which is locally benign, may cause fixation of the lids, at times, with some ectropion; it is the only effect on the eye of the tuberculoid type of leprosy that I have noted in this series of cases. Although rare, these cases show that contrary to the opinions of some authors this lesion has an effect on the globe, even though secondary. Of ophthalmic interest also is the erysipeloid reaction, in which there is a diffuse involvement of the lids resembling erysipelas. It is not important in that its course is benign.

Besides being a rich source of bacilli, the lid lesions are important in that they often affect the eye through the formation of a severe lagophthalmos. It is inevitable that in the healing of the lid lesions scarring would result, so that many of these lesions would result in a residual cicatricial lagophthalmos. In addition, a patient may show a paralytic type of lagophthalmos in which there is a peripheral lesion in the facial nerve, generally affecting the superior branch of the orbicularis. This may be found even in those cases wherein there are no local skin lesions. I have found that these facial-paralysis cases are quite infrequent, being especially found in hospitalized patients who have the terminal forms of leprosy. This infrequency is in contrast to the figures usually quoted in the literature, in which the incidence of facial paralysis is often over 50 percent. Many patients show a mixed type of lagophthalmos in which both the cicatricial and paralytic elements are present.

Conjunctiva. The statement is usually made both in textbooks and in the literature that the conjunctiva is frequently attacked in leprosy. I believe that actual conjunctival involvement is very rare and that the commonly held idea is due to an error of interpretation.

A nodular infiltration of the tarsus and palpebral conjunctiva has often been described as occurring frequently, but such a lesion was not noted in my series. When

seen, they are probably due to secondary invasion from the lids or from the deeper tissues. In two of my cases no leprous lesions could be noted in the lids clinically, but after intravenous administration of methylene blue, stained areas were noted in the tissues. Bacilli were proved to be present in these areas.

Isolated lesions in the bulbar conjunctiva have also been described as of frequent occurrence, particularly around the limbus. I think that such lesions in reality originate in the episclera and involve the conjunctiva secondarily. I have never seen a lesion of the bulbar conjunctiva that was confirmed by histologic examination.

There is no evidence that there is any such entity as a leprous conjunctivitis. However, acid-fast bacilli are often found in the conjunctival cul-de-sacs in the absence of any lesion in the lids and with a negative nasal mucous membrane. In biopsy specimens from the bulbar conjunctiva in clinically normal cases, no bacillic lesions were seen deep in the stroma, even around the nerve trunks.

Invasion of pterygia by leprosy has also been frequently noted in the literature. Many pterygia were removed in this series of cases, but in none was there any histologic evidence of involvement with leprosy.

Episclera and Sclera. Because of its extremely rich blood supply and looseness of tissue, the episclera presents an ideal site for the localization of leprotic lesions. These are of two general types: diffuse episcleritis and a localized or nodular episcleritis or scleritis.

The diffuse type is generally an acute process, presenting itself as a diffuse purplish discoloration typical of lesions situated below the conjunctiva. It is usually quite extensive, but generally of a very transient nature. This is so characteristic that I was never able to make a histologic examination.

The localized type at times occurs very suddenly as an acute nodule, sometime quite slowly as a true chronic lesion. It is usually near the limbus, but may occur well out in the bulbar conjunctiva. It is very often symmetrically placed in the two eyes. It almost always originally arises in the temporal portion. Although occasionally seen superiorly and inferiorly, I have never seen it arise nasally.

In the chronic cases it is first noted as a small, slightly elevated gelatinous nodule, dirty-yellow in color. As it causes no discomfort, it may remain unnoticed by the patient for years. It may then assume an acute character and within a few days become quite large. In other cases the course from the first is acute. In two or three days a large nodule may form from an apparently normal conjunctiva. These cases are almost constantly limbal in nature. There is usually some indefinite ocular discomfort in the acute type.

The episcleral lesion usually progresses toward the limbus, around which it may then tend to grow, giving an appearance suggestive of the limbal hypertrophy of vernal catarrh. However, I have never seen it completely surround the limbus. Once having reached that point, the lesion is progressive, with invasion of the cornea, which will be discussed later.

Bacilli are always found abundantly in these lesions. The ultimate histologic evolution is in the direction of a localized sclero-corneal leproma. This supports the conclusion that this lesion is a specific infiltration, probably metastatic.

Cornea. The incidence of keratitis in leprosy is extremely high, primary involvement having been seen by me exclusively in the lepromatous type. Both eyes are usually affected; there is seldom an advanced lesion in one eye with the fellow relatively free. In time there is a more or less perfect similarity between the two corneas.

In primary leprous involvement of the corneas there are two types, an interstitial or infiltrative keratitis and a nodular keratitis or corneal leproma. These two types have, in general, a similar histologic background, since both of them usually arise by invasion of the cornea from episcleral lesions. They differ chiefly in clinical characteristics, the former being diffuse, the opacity extending in time throughout almost the whole extent of the cornea, with little change in thickness or luster. The latter consists of a localized module with an enormous, up to tenfold, thickening of the cornea. Both types are

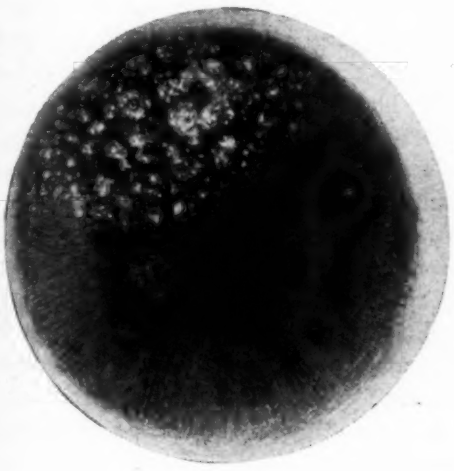

Fig. 1 (Mendonça de Barros). Infiltrative keratitis ("Sclerotic scatter." Microscope with Oc-2, Obj. 2—5.5 by 2×, right eye). The infiltration is most marked in the superior temporal quadrant, and consists of numerous rounded and well-defined foci, which occupy the anterior layers of the stroma. No vessels are seen. This case is shown by direct slit-illumination in figure 2. This type is called "superficial punctate keratitis of leprosy."

surprisingly symptom free. There is usually no ciliary infection, pain, or photophobia, and the visual acuity remains good for a comparatively long period.

In a manner surprisingly uniform, infiltrative keratitis practically always was first noted in the superior temporal quadrant (fig. 1), starting as a number of small white dots in the anterior third of the corneal stroma which coalesce to form a small area of deep infiltration (fig. 2).

Fig. 2 (Mendonça de Barros). Corneal infiltration under high magnification (Oc. orthosk. 12.5, Obj. 6, lens of 7 cms. focus). A number of small nodules which serve as the center of a delicate zone of infiltration. There is a true punctate indentation of the cornea.

This extends nasally and inferiorly so that the inferior nasal quadrant almost always retains its transparency the longest. In only one case was involvement of the inferior nasal quadrant originally noted.

In all cases the infiltration was chiefly in the central third of the stroma. In most instances there were areas of denser infiltration resembling tiny scattered nodules scattered throughout the opacity. In some cases the infiltration remained uniform, extending throughout the whole thickness of cornea. Again, the nodules were quite superficial, causing a surface elevation. In a few cases, the infiltration was both superficial and very deep, leaving the intermediate layer almost uninvolved.

The extraordinary predilection which the infiltrative foci have for the corneal nerves is extremely interesting (fig. 3). These nerves are usually easy to see, often showing not only well-defined nodular formations attached like beads, but also a diffuse, surrounding infiltration. Eventually fusion of the foci occurs.

Vascularization is not an early finding and is usually present only late in the course of a keratitis. The vessels appear only after the keratitis has attained a large size. The vessels are usually both superficial and deep. Erosions are rare in this form of keratitis and are usually associated with an edema of the epithelium.

The course of this type of keratitis is practically always progressive, the infiltration eventually spreading throughout the entire extent of the cornea. In only a few cases did this infiltration localize in the upper temporal quadrant, become vascularized, and remain unchanged for years. Usually a diffuse leucoma develops with flattening and shrinking of the cornea. There is usually no clearing of the corneal opacity although in a few cases this has occurred. In my opinion it is due to a hyalinization of corneal scar.

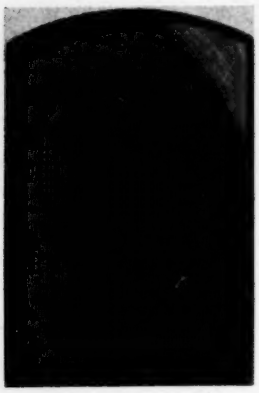

Fig. 3 (Mendonça de Barros). Perineural infiltration of the cornea (patient Atilio C., mic. with Oc. 4, Obj. 2, employing the direct method and focusing upon the center of the nerve bundle toward the periphery of the cornea). Note the sleeve-like formation around the nerve as well as several well-defined nodules.

I have presented previously a series of 62 cases showing that in the great majority of the cases bacilli were present. The localization of the infiltration in the anterior third is probably due to the fact that the spread is from the episclera and along the corneal nerves.

Nodular keratitis differs from the previous form by the development of a discrete inflammatory mass. This lesion often appears in those patients who are victims of a massive infection in contrast to the infiltrative form, which is often seen in patients with a minimal infection.

As a rule leproma of the cornea represents invasion of the cornea from an episcleral lesion which is usually seen near the temporal limbus. In the region of the episcleritis there is first noted a slightly yellowish infiltration of the deep stroma with early vascularization. Usually, this lesion slowly develops into a localized nodule, but the nodule formation may take place very rapidly. Occasionally the nodule may form from the diffuse infiltrative type of keratitis by coalescence of the small infiltrates. These nodules have a typical dirty-yellow color resulting from a large number of Virchow cells full of fat. These lepromata are generally bilateral and often symmetrical. The vascularization is usually very marked. The lesion is frequently so indolent that it is practically symptomless except for the irritation that may arise from its size. It is very hard and often undergoes central necrosis. As the nodule spreads throughout the cornea, the progressive necrosis causes a weakening of the corneal stroma with a resulting staphyloma and eventual loss of the globe.

Besides these two forms of primary corneal involvement, there are a number of cases of keratitis which are secondary to other lesions. A small number of cases of ulcerative keratitis were found present in both cicatricial and paralytic lagophthalmos. This is about the only type of leprotic keratitis in which there is true corneal ulceration. Keratitis secondary to iridocyclitis is due to the toxic action of the massive anterior-chamber exudates. These coming in contact with the posterior surface of the cornea cause an invasion of the corneal stroma with vascularization, which often tends to be ring-shaped near the limbus. Rarely are cases of bulbous

keratitis seen in cases of long-standing keratitis with degeneration.

IRIS. Although less frequently attacked than the cornea, iris involvement is very common. However, I have never seen any case in which the iris lesion was noted without previous involvement of the cornea. The cases of iritis as seen by me may be divided into a diffuse lesion with acute and chronic forms and the miliary lesion in nodular iritis.

Acute diffuse iritis of leprosy presents little or nothing typical of the disease. It is usually an acute exacerbation of a preexisting chronic iritis, and after one or more acute attacks reverts to a chronic type. The onset is usually abrupt, with intense pain and photophobia, blurring of vision, and blepharospasm. Although binocular involvement is almost the rule, the acute attack is not usually simultaneous. The attack often follows cauterization of a limbal episcleral nodule. On examination, ciliary infection is not commonly observed, but corneal edema, keratitic precipitates, and anterior-chamber exudates are the rule. These gelatinous masses are usually composed of fiberlike filaments which branch, often forming a diffuse web, and tend to develop on the anterior surface of the iris. The attack is of variable duration, but is usually in direct relation to the general condition of the patient. In favorable cases the symptoms may disappear in two to three weeks, but many cases become chronic. Frequent recurrences are very common. It is worth noting that this is the only acute form of ocular leprosy. A peculiarity often noted is a resistance to dilation with atropine.

In the chronic type there is almost complete absence of inflammatory symptoms, the only complaint being slight blurring of vision. There are usually some corneal edema, faint aqueous flare, fine deposits in the endothelium. Often exudates in the anterior chamber, such as are observed in the acute form, are seen. Also, as in the acute form, eventual bilateral involvement is the rule.

As in any iritis, both the acute and chronic forms show eventual posterior synechiae, iris atrophy, and organization of the anterior-chamber exudates. As noted previously, these exudates often form a ring-shaped band at the base of the iris with secondary keratitis. If marked, this type also commonly is associated with secondary glaucoma.

The miliary or nodular type of iritis is characterized by the presence in the iris stroma of small translucent nodules seen only with the aid of the slitlamp (figs. 4 and 5). Very often any other inflammatory sign is completely absent and the vision normal. This reaction may be present for years without great damage to the eye. The nodules are most often seen in the region of the sphincter, where they may form a complete collar. They may disappear to be replaced by a new formation of nodules. There may be coalescence of some few nodules, but a very large conglomerate nodule is never seen. A pseudo nodule may appear after the diffuse form. This consists of a tiny bit of the commonly seen anterior-chamber exudate. It is noted that these are situated on the surface of, and not in, the stroma.

AFFECTION OF THE POSTERIOR SEGMENT. Although there is no satisfactory explanation for it, leprologists, almost unanimously agree that the posterior segment of the eye is spared almost without exception. Personally I have never seen a case of proved posterior-segment involvement.

RESULTS OF OBSERVATIONS

As stated previously, I have personally observed 1,279 cases of leprosy, each being carefully examined with the slitlamp at least once a year, oftener if the case is early or progressive. The high percentage

of involvement observed by me is due to the slitlamp examination, for without it this incidence would probably be no higher than 30 to 40 percent. At the time of the last examinations, the 1,279 patients were classified from their systemic findings as follows:

Type	*No. of Cases*	*Percentage*
Lepromatous	826	64.7
Tuberculoid	261	20.4
Noncharacteristic	190	14.9

In the lepromatous type there was ocular involvement in 540 cases of the 826 or about 65.3 percent. In each of these 540 cases there was involvement of the cornea; in other words, no case in which the eye was involved was without corneal lesion. Clinically, I could verify the presence of an episcleral lesion in only 8.5 percent of those with ocular disease, or only 5.6 percent of the lepromatous group. This number is small, for the early involvement of the episclera alone is difficult to diagnose, owing to its small size and the fact that it is deeply placed. This small percentage does not invalidate my contention that the episcleral involvement usually precedes the corneal lesion, for many of these episcleral nodules are almost microscopic. The iris was attacked in 180 cases —24.5 percent of the lepromatous group and 35.1 percent of those with ocular involvement. Of these, 139 were of the diffuse type, acute or subacute. Miliary nodules were noted in 69 patients. In 33 cases the routine examination showed signs of an old, healed iritis. Of these, 16 patients had a subsequent acute attack.

In the tuberculoid type there were only 4 cases of ocular disease in the total number of 261. In two of these cases there were lesions of the buccal region, and first a paralytic, later a cicatricial lagophthalmos with exposure keratitis. The third was a case of typical facial paralysis with

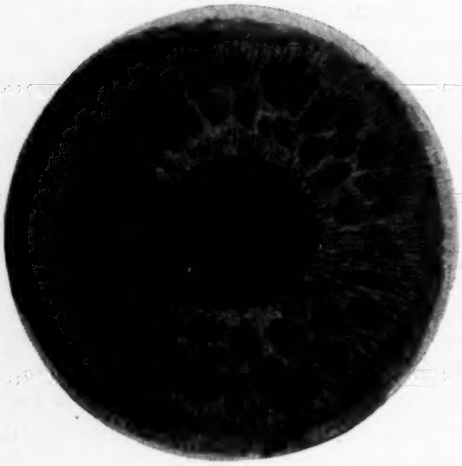

Fig. 4 (Mendonça de Barros). Miliary nodules in the iris (right eye, patient P. G., Oc. 2, Obj. 2, diffuse illumination). Myriads of miliary nodules are found in the iris, especially temporally, filling the crypts; others are seen in the depths of the mesodermal layer. The pupil is round. There is no exudation into the aqueous humor.

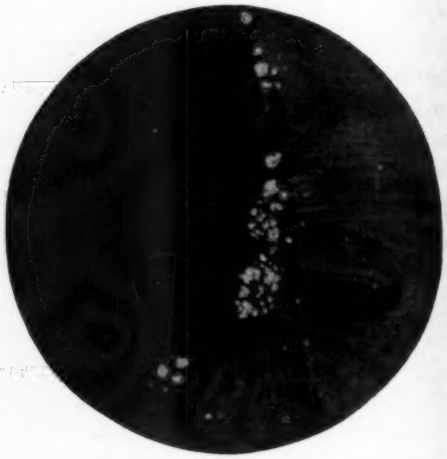

Fig. 5 (Mendonça de Barros). Nodular cauliflower formations (Oc. 12.5, Obj. 6, diffuse illumination, left eye). There are sharply rounded deposits on the cornea; marked atrophy of the iris tissue. In this case, the formations were observed after intense exacerbations of acute diffuse iritis.

marked ectropion and lagophthalmos. The fourth case presented an extensive facial lesion, with resultant ectropion and involvement of lid margin of the opposite side. Thus in these cases there was no direct ocular involvement.

Noncharacteristic leprosy was present in a total of 196 patients, a great majority of whom were children. In 19, or about 10 percent, the examination was positive, all of them showing corneal lesions. In 17 cases the findings were doubtful. In the positive cases, the ocular lesions suggested that the leprosy was of the malignant form, even though the general type was noncharacteristic. The course of these cases will be carefully observed to determine whether the ophthalmic examination is of value prognostically in the noncharacteristic type of leprosy.

In conclusion it can be stressed that the ocular complications of leprosy are restricted to the anterior segment, the cornea being usually involved. Iritis is also common, but found only in conjunction with corneal disease. The keratitis is thought to be due to extension from limbal episcleral lesions. The primary ocular lesions are practically limited to the lepromatous or malignant type of general disease in which many bacilli are present. The ocular lesions are only secondary to facial involvement in the benign tuberculoid form. In the noncharacteristic form, common in children, the ocular findings may be of prognostic significance.

Rua Marconi, 34-4º.

Discussion

Dr. Peter C. Kronfeld (Chicago): Dr. Mendonça de Barros is no stranger to the United States of America. He is the author of the monograph "Some clinical aspects of the ocular involvement in lepers," which was published under the auspices of the Department for the Prophylaxis of Leprosy of the State of Brazil one year ago. This monograph, though written in the Portuguese language, also contains a slightly condensed translation into English which together with the excellent illustrations has put the author and the sanatorium "Padre Bento," where all the work was done, on the map for the North American readers. Today Dr. Mendonça de Barros has probably presented here as vivid and comprehensive a picture of leprosy of the anterior segment of the eye as has ever been presented at an ophthalmologic meeting. Having been asked to open the discussion, I believe it would be a mistake if I tried to add to this picture by reporting some of my personal experiences with regard to ocular leprosy. It is true that I have had the opportunity to examine a large number of patients with ocular leprosy. These were inmates of various leprosaria in the Far East, in China, in Japan, and in the Philippines. In most instances, however, I saw these patients only once and had only a loupe and a flashlight at my disposal. At the Peking Union Medical College, with which I was associated from 1933 till 1939, I saw only very few lepers, who usually were admitted for the treatment of conditions other than their leprosy. The ocular manifestations of leprosy which I saw in these patients were, in general, on the same order as those shown and discussed here today by Dr. Mendonça.

I believe that as the first discussant it is my duty to recognize the special opportunity constituted in Dr. Mendonça's presence here. And I hope he will not mind my asking him questions pertaining to problems of leprosy which have not been mentioned in his paper. Physicians prac-

ticing in the Far East are placing considerable stock in the so-called climatic theory, which was lately expressed again in a study by Shionuma Einosuke (Lepro, Osaka, 1939, v. 8, p. 57). According to this author the severity of the ocular symptoms depends to some extent upon the climate. The higher the temperature the milder are the ocular symptoms and vice versa. In general, leprosy is supposed to be a milder disease in the tropics than in a moderate climate. The Japanese author has recommended to the government that leprosaria should be located only in the southern parts of Japan. Viallefont and Fuentes have expressed a similar view (Ann. d'Ocul., 1939, v. 175, p. 380). I would like to get Dr. Mendonça's opinion with regard to this question.

We have been following with a great deal of interest the controversy that has been going on in the Brazilian ophthalmologic literature with regard to the question of early choroidal involvement in leprosy. The viewpoint of the pathologist who sees more late than early stages of the disease (Ginsberg in Henke-Lubarsch's "Special pathology") is that the retroequatorial portion of the uvea is usually spared. Most clinicians have agreed with this view. It was therefore surprising when Hoffman reported early clinical choroidal involvement. The recent paper by Sergio Valle (Arqu. braz. Oft. 1938, v. 1, p. 31) seems to take a very sensible stand in the matter. Valle admits that the course and the manifestations of leprosy may vary in different countries. He observed choroiditis in a number of lepers, which, he believes, was probably caused by tuberculosis or lues. He summarizes that the leprous etiology of choroiditis has not been proved anatomically or clinically.

While a very remote subject for most North American ophthalmologists, this discussion of a disease that affects in considerable number in a neighboring country I am sure has been of great interest and value.

CONCENTRATION OF PENICILLIN IN THE AQUEOUS HUMOR FOLLOWING SYSTEMIC ADMINISTRATION*

ARNO E. TOWN, LT. COMDR. (MC), U.S.N.R., AND MARGARET E. HUNT, PHM1c, U.S.N.R.
New York

Penicillin has been used for infections of the eye with varying degrees of success. Some types of infection, such as gonorrheal ophthalmia, have been shown to respond readily to this therapeutic agent whereas the intraocular infections respond with difficulty, if at all. To determine what might be expected from systemic therapy an investigation of the concentration of penicillin in the aqueous humor in relation to blood levels was undertaken.

Von Sallmann and Meyer[1] had previously shown that local application, with iontophoresis, as well as intravenous injection of penicillin resulted in a demonstrable concentration of the agent in the aqueous humor. A careful study by Struble and Bellows[2] revealed the distribution of the agent in various structures of the eye following parenteral and topical application.

No reference to the effect of varying systemic dosages on concentration of penicillin in the eye was found. In a report on the clinical efficacy of the drug in ophthalmic diseases, Keyes[3] indicates that little is known about the secretion of penicillin into the secondary aqueous in the presence of a high blood concentration. He also points out that the rapidity with which the level of penicillin in the aqueous is reduced by normal drainage has not been ascertained.

EXPERIMENTAL PROCEDURE AND RESULTS

Rabbits were chosen as the experimental animal, subsequently monkeys for a series of confirmatory experiments. Commercial preparations of the sodium and calcium salts of penicillin were administered by the intravenous or intramuscular route.

The concentration of penicillin in blood serum was determined for correlation with that found in the aqueous humor. For this, samples of blood were withdrawn by cardiac puncture or from an artery in the ear at intervals of 5, or, in some instances, 10 minutes prior to collection of aqueous humor.

Employing a fine hypodermic needle and a syringe, paracentesis of the cornea was performed for withdrawal of approximately 0.2 ml. of aqueous humor. Secondary or plasmoid aqueous was collected 40 minutes after withdrawal of the primary fluid, at which time it had re-formed in sufficient quantity to bring the tension in the anterior chamber to normal.

The Rammelkamp[4] method of assay was employed. This is a serial-dilution method, using the hemolytic streptococcus as test organism. Relative Oxford units are calculated by comparison with an assay done concurrently on a standard solution. Under conditions of the test, a concentration of 0.0195 units of penicillin per milliliter of the test solution was required for complete inhibition of the organism.

The animals were tested in experimental groups of four or five. In the early studies one animal in each group

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The opinions and views set forth in this article are those of the writers and are not to be considered as reflecting the policies of the Navy Department. A thesis presented to the American Ophthalmological Society in partial fullfillment of the requirement for membership.

served as a control, receiving no penicillin. At no time was an inhibitory effect demonstrated with the blood serum or aqueous humor of these control animals against the streptococcus used in the penicillin assay.

Individual animals showed a marked variation in the concentration of penicillin found in the blood and aqueous humor following intravenous injection. In a total of 16 rabbits, weighing between 2.4 and 3.4 kilograms, four served as controls and each of the remaining 12 received 30,000 units of penicillin. Blood samples withdrawn at 25 minutes from these 12 test animals yielded from 0.625 to 10 units per milliliter of serum and samples at 60 minutes varied from 0.0781 to 2.5 units per milliliter of serum. Concentrations of 0.0195 to 0.1563 units per milliliter were found in the primary aqueous humor withdrawn at 30 minutes. In each instance the concentration in the secondary aqueous humor withdrawn 70 minutes after the intravenous injection of penicillin approached or equaled that in the blood serum collected 10 minutes earlier, and the values for the 12 animals were from 0.0781 to 2.5 units per milliliter of fluid.

Following intramuscular injection there was found to be less variation for the individual animals than after intravenous injection. The concentration of penicillin found in the blood serum and aqueous humor of 35 rabbits receiving the therapeutic agent by intramuscular route in varying dosage is shown in figures 1 and 2. In the serial-dilution method of assay used, the result is based on the highest dilution giving complete inhibition of the test organism. Since each successive dilution results in a concentration one half that of the preceding sample, the true endpoint of inhibition lies in the range between the dilution giving complete inhibition and the next higher one. In these figures, that range is indicated by a bar at each point on the abscissa. Penicillin was found in demonstrable quantity in each sample tested.

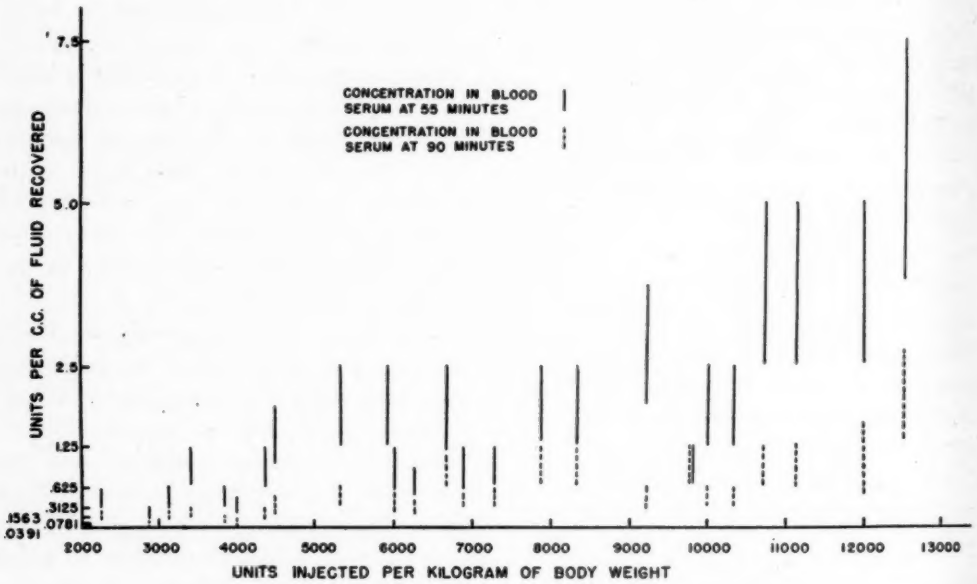

Fig. 1 (Town and Hunt). Penicillin levels in blood of rabbits following intramuscular injection.

The concentration of penicillin in the blood of the 35 animals receiving intramuscular injection, was found to increase as the dosage level was raised (fig. 1). The curve of blood concentration rises gradually as the dose is increased to 5,000 units per kilogram of body weight. At that point the curve levels off until a dosage of 9,000 units per kilogram is reached, when it again climbs sharply. It may be that the ability of the kidney to excrete penicillin is not exceeded by this intermediate dosage of 5,000 to 9,000 units per kilogram of body weight. Larger dosage may then result in a sharp rise of blood concentration, when the absorption rate exceeds the excretory rate.

The primary and secondary aqueous humor of these same 35 animals was withdrawn following the collection of blood samples to determine the corresponding penicillin concentration in the aqueous at the varying dosage levels (fig. 2). In the primary aqueous humor of animals receiving small doses, the penicillin levels were found to be low. With increasing dosage, the rise in concentration in the aqueous was proportional, but a high level was never obtained. The concentration was, however, sufficient to be considered of therapeutic value with all doses above 7,000 units per kilogram of body weight. Following paracentesis, the aqueous fluid re-formed within 40 minutes with a concentration of penicillin which approached or equaled that of the blood serum. It is well known that this secondary aqueous humor contains many of the constituents of blood serum, including sufficient fibrin to cause spontaneous coagulation unless an appropriate anticoagulant is employed. It is apparent that, as the intraocular fluid re-forms after paracentesis, the penicillin is transmitted directly from the blood as one of the serum constituents. These findings suggest that an infection accompanying a perforating injury to the eyeball might be expected to respond more readily to intravenous or intramuscular injections of penicillin than one in which there is no escape of intraocular fluid.

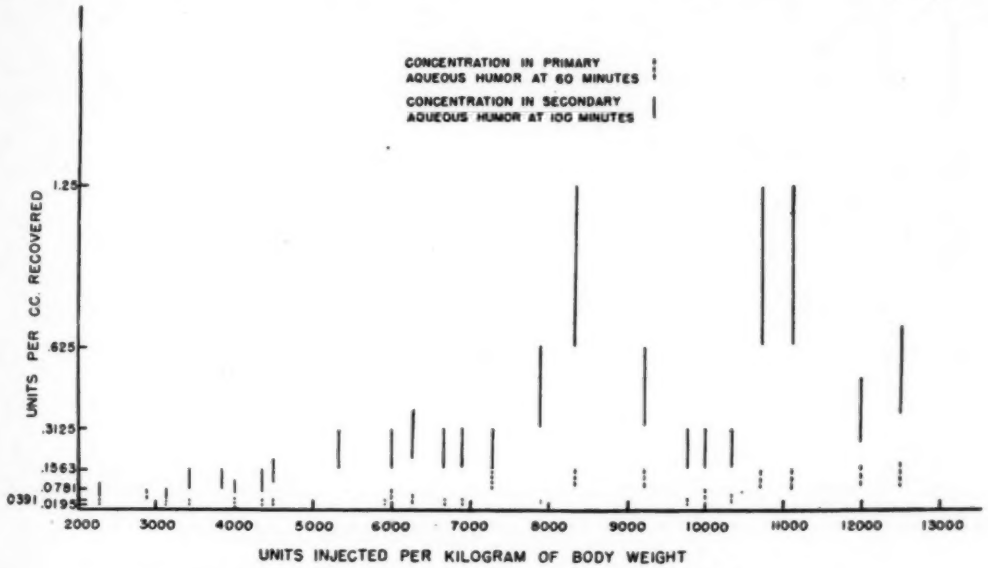

Fig. 2 (Town and Hunt). Penicillin levels of aqueous humor of rabbits following intramuscular injection.

The rate of loss of penicillin from the blood and aqueous humor of rabbits was studied following intravenous and intramuscular injections. Blood levels fell rapidly after injection by the intravenous route, as is indicated by the finding that 80 minutes after injection of 30,000 units in a rabbit weighing 2.8 kilograms, penicillin was present in a concentration of only 0.0391 units per milliliter of serum. In the primary aqueous fluid the level reached a slight elevation at 45 minutes, after which time it descended in a definite but gradual curve.

With intramuscular injection the decrease of concentration in the blood was somewhat more gradual than with intravenous injection, although it was still rapid, as will be seen in figure 3. The peak of concentration in primary aqueous fluid occurred at 50 minutes following injection by this route. Although the level was never high, it would appear to be of therapeutic significance that this low level was maintained fairly constantly for over 90 minutes following a single intramuscular injection. Following paracentesis in the presence of a high blood level, the concentration in the aqueous rose sharply. Experimenal results showed that the rate of decrease of penicillin in this secondary aqueous followed, in general, the curve of decrease in the blood. Although the concentration did not reach the high levels found in early blood samples, it was resorbed more slowly.

In one group of rabbits each animal, weighing approximately two kilograms, received 15,000 units every three hours over a period of 24 hours. Assays of blood serum and aqueous humor showed no cumulative increase in concentration of the penicillin.

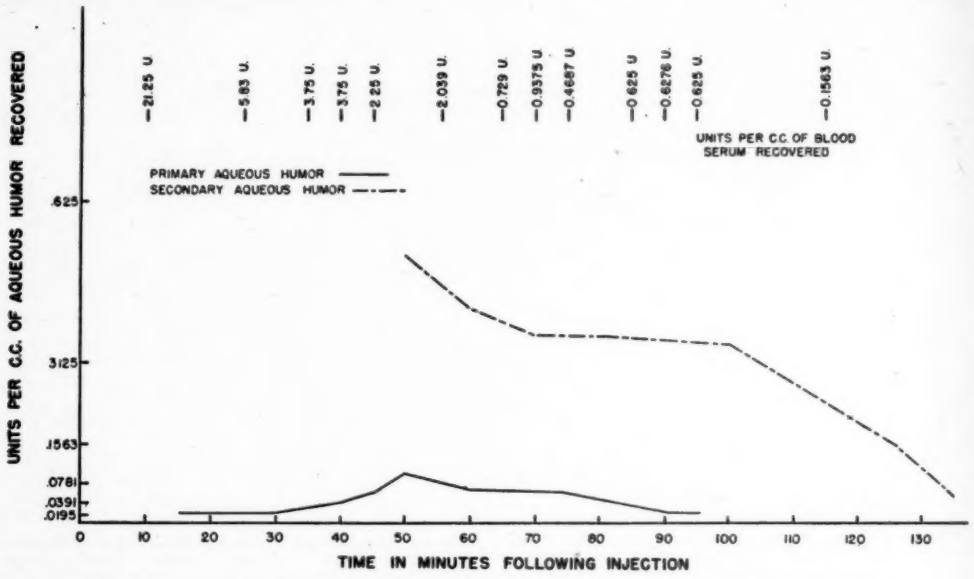

Fig. 3 (Town and Hunt). Penicillin levels in aqueous humor and blood of rabbits following intramuscular injection of 30,000 units.

Results obtained with monkeys were comparable in all instances to those obtained with rabbits. The relative concentration of penicillin in the blood serum and aqueous humor was similar and all findings confirmed those in the rabbit.

Conclusions

The foregoing findings show that, fol-

lowing systemic administration, penicillin is present in the aqueous humor in concentrations that are low in relation to blood levels. Massive doses of the therapeutic agent are required for an appreciable increase in this level. Penetration into the aqueous humor appears to occur slowly, and the decrease in concentration is gradual. Continued, frequent injections maintain a low level without increment. Following paracentesis the aqueous humor is re-formed within 40 minutes with a concentration of penicillin approximating that of the blood serum.

140 East Fifty-fourth Street.

References

[1] Von Sallmann, L., and Meyer, K. Penetration of penicillin into the eye. Arch. of Ophth., 1944, v. 31, Jan., pp. 1-7.

[2] Struble, G. C., and Bellows, J. G. Studies on the distribution of penicillin in the eye and its clinical application. Jour. Amer. Med. Assoc., 1944, v. 125, July 8, pp. 685-690.

[3] Keyes, J. E. L. Penicillin in ophthalmology. Jour. Amer. Med. Assoc., 1944, v. 126, Nov. 4, pp. 610-615.

[4] Rammelkamp, C. H. A method for determining the concentration of penicillin in body fluids and exudates. Proc. Soc. Exp. Biol. Med., 1942, v. 51, pp. 95-97.

FASCIA-LATA TRANSPLANT FOR RETROTARSAL ATROPHY OF UPPER LID FOLLOWING ENUCLEATION

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About 30 percent of all patients who have had an enucleation develop a sinking of the orbital contents posterior to the septum orbitale in the upper lid. Attempts have been made by artificial eye makers to overcome this condition by enlarging the upper part of the prosthesis with a bulge to press the upper-lid fold forward. The results have not been too gratifying since this procedure limits the movement of the prosthesis.

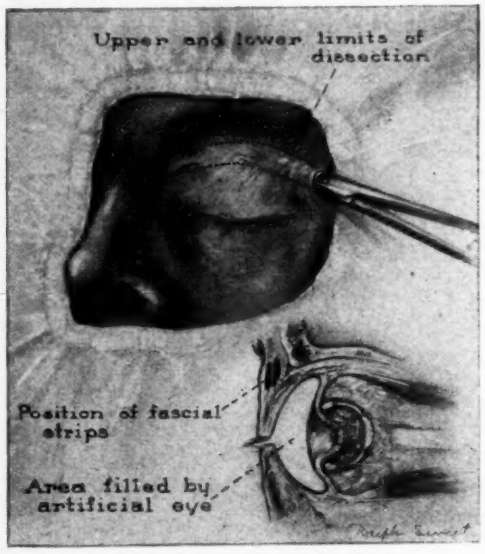

Fig. 1 (Cutler). Dissection and scheme to show insertion of fascia lata.

According to Spaeth[1] fascia and fat and scales of cartilage have been used to fill in this defect. Plastic material has also been used.[2] The recent literature discloses no satisfactory study of this problem.

Any material placed behind the septum orbitale has a tendency to disappear into the orbit and may exert pressure downward on the levator and interfere with the action of this muscle. Since it is really the restoration of the normal lid fold that is desired and not the filling-in of the orbital contents, it was decided to place fascia between the septum and the orbicularis. If the lid fold on the normal side is examined, it will be observed that it is only necessary to add bulk and weight in the lid immediately below the brow line to restore this fold. In this region the greatest space is available between the skin of the lid and the septum orbitale (fig. 1) and also between the orbicularis and the levator. If the fascia is placed lower than this, pressure is exerted on the levator and a partial ptosis results. One further precaution is necessary. The fascia must be placed beneath the orbicularis, otherwise it will adhere to the skin, and the result is induration and scar-tissue formation.

Up to the present time 134 patients have been operated upon by various members of the staff at this hospital.

OPERATIVE PROCEDURE

Anesthesia. Three different methods of anesthesia were tried: General (either inhalation or pentothal sodium); combination of spinal and local; and local. The last-named method was found to be the most satisfactory.

Obtaining the fascia. Only fresh fascia lata obtained from the patient himself has been used up to this time. This is procured from the lateral aspect of the thigh. Any standard procedure may be used.

The lateral aspect of the thigh down to the fascia lata over an area measuring 12 by 30 cm., beginning about 5 cm.

below the trochanter is infiltrated with 1-percent procaine containing 1:50,000 adrenalin. A skin incision about 5 cm. long is made lengthwise, beginning about 5 cm. below the trochanter. This is carried down through fat to the fascia. The latter is exposed for the length of the incision. Parallel incisions are then made lengthwise through the fascia 10 to 12 mm. apart; the upper end is cut across and carried through a Masson stripper, and while this end is held with a clamp, the stripper is passed down the leg to the desired length (about 15 cm.) and the fascia cut by rotating the handle of the stripper. The fascia is then removed. Difficulty may be encountered with transverse fibers near the upper end of the fascia; these can be cut with a needle guide which has the notch sharpened. The incision is closed with 00 chromic catgut sutures and interrupted silk sutures for the skin. No disfiguring scar remains.

This fascia is then placed in normal saline until the lid has been made ready to receive it, as described below.

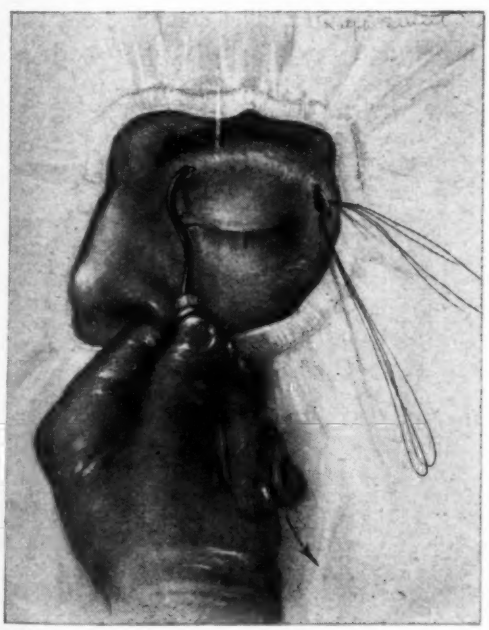

Fig. 2 (Cutler). Two loops of medium black silk are drawn through the tunnel in the lid.

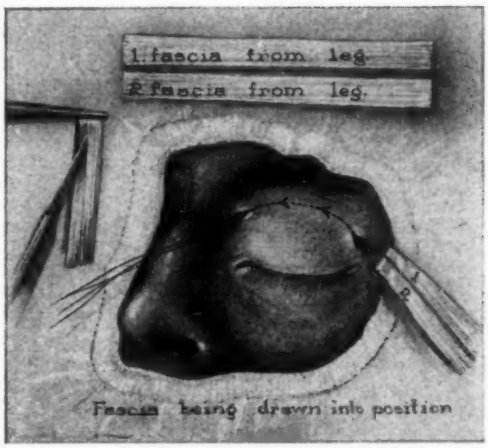

Fig. 3 (Cutler). Fascia being drawn into position.

Lid operation. The upper lid below the brow line is infiltrated with 2-percent novocaine and 1:50,000 adrenalin over an area extending from the nose to 2 cm. beyond the outer canthus. This procedure is advisable even if general anesthesia is used, as it facilitates dissection. A skin incision about 1.5 cm. long is made just lateral to the outer canthus and parallel to the curve of the brow. This is carried through the orbicularis. With curved scissors (Stevens or similar scissors), sharp and blunt dissection is used to tunnel under the orbicularis toward the nose, care being taken to follow the curve of the brow (fig. 1). Two loops of medium silk are now carried through the incision from the temporal side with an aneurysm needle. The loops protrude through the temporal incision (fig. 2).

Previously obtained fascia is then prepared and placed in the following manner: A double strip of fascia is laid along the curve of the lid and cut to the desired length. Two double strips of fascia are thus obtained. Each piece of fascia is then held in a mosquito clamp at the middle (fig. 3) and shredded with a sharp-pointed Bard-Parker knife. The fascia is smoothed flat and each strip laid

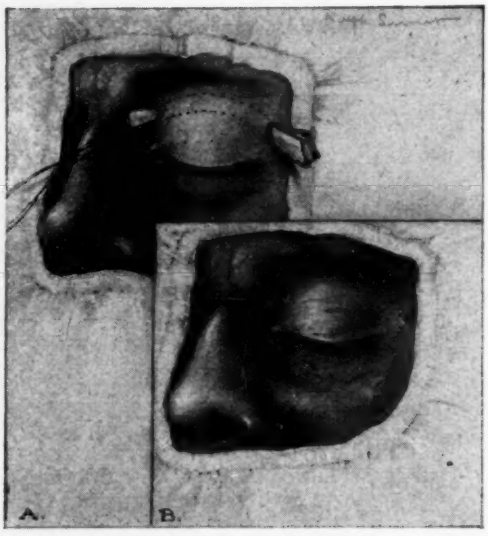

Fig. 4 (Cutler). A, fascia in position ready for tapering of ends. B, final closure.

through a separate loop of the previously placed sutures (figs. 3 and 4) and then drawn into the lid. The fascia should project a little through each incision. The sutures are cut and removed and the looped ends of the fascia cut. The protruding ends of the fascia are tapered with scissors and tucked under the orbicularis. The latter is then closed with one or two 4-0 chromic catgut sutures, and the skin is closed with one or two 4-0 silk sutures (fig. 4). The fascia is then massaged slightly to make sure that it is lying flat, and a Wheeler patch is applied. The prosthesis may be left in the socket if desired.

Postoperative course. The dressing is removed in three or four days and the skin sutures removed. If unusual lid edema is noted, a dressing may be reapplied for an additional two days. Some edema persists for a week to 10 days. In occasional cases, some edema may persist for several weeks. If, after all edema has disappeared, it is found that insufficient fascia has been implanted, an additional amount may be placed where it is needed. If too much has been used, some of the strands can be readily removed.

Patients have been observed for periods up to four months. One patient was killed in an automobile accident approximately 3½ months after the implantation. At autopsy the fascia was found to be unchanged in its orginal position (fig. 5). There was still some round-cell infiltration present. This patient had a somewhat prolonged edema of the lid postoperatively which gradually receded. The pre- and postoperative photographs are shown in figures 6 and 7. Following is the report of the pathologist:

"Sections through the fascia-lata implant in the left upper eyelid show viable fascia. There is no necrosis. There are, however, foci of granulomatous inflammation, characterized by exudation of lymphocytes, proliferation of histiocytes, and numerous foreign-body-type giant cells. There is also deposition of crystalline pigment, presumably hematogenous in origin. The fascia gives evidence of a foreign-body reaction."

Complications. The complications that may arise can, for the most part, be

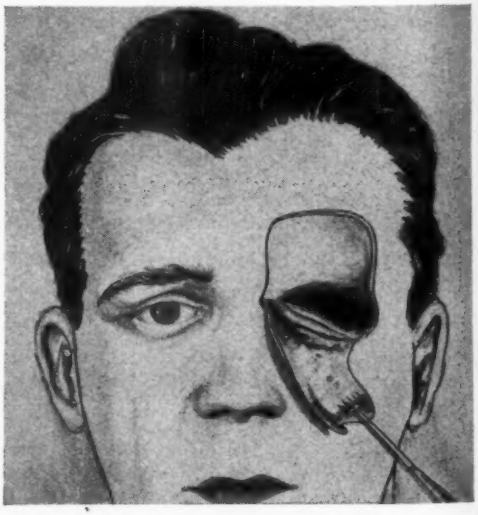

Fig. 5 (Cutler). Drawing made at autopsy, 3½ months after implantation of fascia.

Fig. 6 (Cutler). A, preoperative view of lid. B, two weeks' postoperative view of lid.

Fig. 7 (Cutler). A, preoperative view of patient in figure 5. B, 3 months' postoperative result.

guarded against. The fascia must be put in smoothly in order to insure a smooth appearance. It must be placed close to the brow line, and the lower side of the dissection must follow the curve of the brow. Otherwise, the fascia will take the shortest course across the lid and be too low.

Care must be taken to keep the fascia under the orbicularis to prevent scarring. One patient, for some reason, showed a continued reaction and swelling for several weeks, and the fascia had to be removed.

Summary

A procedure for restoring the normal upper-lid fold after enucleation, used on 134 patients, is described with a postmortem report on a patient operated on 3½ months earlier.

Dibble General Hospital.

References

[1] Spaeth, E. B. The principles and practice of ophthalmic surgery. Philadelphia, Lee & Febiger, 1939, p. 207.
[2] Mullin, C. J. Personal communication.

NONPERFORATING CYCLODIATHERMY FOR THE TREATMENT OF GLAUCOMA*

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Vogt and his associates[1, 2, 3] have recently introduced the cyclodiathermy operation for the treatment of glaucoma. The operation employs a diathermy needle similar to that used for retinal separation to destroy a portion of the ciliary body by multiple punctures through the overlying sclera. An atrophy of the ciliary body has been confirmed histologically;[1, 4] therefore a reduction in the formation of aqueous would be expected to follow. Vogt's procedure has been designated as "perforating cyclodiathermy" to distinguish it from the "nonperforating" method employed by Albaugh and Dunphy,[4] who used contact with a broad electrode to the sclera over the ciliary region. The following report is based upon the observations made on 28 eyes afflicted with various types of glaucoma which were treated by nonperforating cyclodiathermy.

The operative procedure followed closely the originally described method.[4] Subsequent to instillation of an anesthetic and a retrobulbar injection of procaine and adrenalin, a conjunctival flap was reflected toward the limbus over half the eyeball. The tip of a 2-mm. rounded electrode was used in the earlier operations, and later the flat end of a round stainless-steel pin 2 mm. in diameter. A small Bovie high frequency electro-surgical unit set at 35-40 furnished the coagulation current. The electrode was held in contact with the sclera from 4 to 5 seconds to form a single row of points over the ciliary region. The amount of current, the time, and the degree of pressure upon the sclera are all variable and arbitrary. The optimum area of coagulation was for the 2 mm. covered by the tip of the electrode and extending for not more than 0.5 mm. beyond its edge. Coagulation exceeding this amount led to an excessive postoperative reaction. A closure with a tight running silk suture was found the most effective means of avoiding a postoperative retraction of the conjunctiva with an exposure of the treated portion of the sclera. In the few instances where retraction occurred, the sclera was slow in healing. Because of the possible danger of too extensive destruction to the anterior circulation of the eye, no more than two-thirds of the ciliary body was treated in any one eye. At first, because intraocular pressure was not immediately relieved by the operation, there was hesitation in employing atropine postoperatively. Later atropine was used routinely and in most instances was continued until the uveitis subsided. At the first dressing of the atropinized eyes, the pupils were dilated only in the segment not operated upon. These pupils remained permanently oval, and the iris failed to respond to light over the segment that had undergone operation.

Usually there was ocular pain for about 24 hours postoperatively, at which time the eyes were comfortable regardless of any abnormally high intraocular pressure. Albaugh and Dunphy[4] attribute a postoperative rise in tension to a mechanical shrinking of the sclera with reduction of the total contents of the eyeball. Apart from this action there is the effect of the adrenalin used, for adrenalin temporarily

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reduces intraocular pressure in a glaucomatous eye although it may later induce a stasis and edema.[5] The elevated tension is probably due principally to the injurious effect of the diathermy upon the endothelium of those vessels of the ciliary body that are not actually destroyed. The injury is comparable to a burn upon the body surface where the transudate accumulates in cutaneous blebs. Occurring within the unyielding confines of the eyeball, this process is followed by extreme elevation of intraocular pressure. Occasionally, to counteract this, the operation was followed by a paracentesis sufficiently large to remain open for at least 24 hours.

In most instances intraocular pressure dropped slowly and steadily for several days before it returned to normal. There was a further reduction to a point of extreme hypotony, lasting for weeks or until the uveitis subsided, when the tension returned to normal or again became elevated. During the stage of hypotony the anterior chamber was reduced as much as a third of normal depth. Several eyes were tender during this period. The preoperative incompensation and high tension were never reached by such eyes as returned to a glaucomatous state postoperatively. A most striking sequel of the operation was the relief from ocular pain.

A constant occurrence was a faint opacification with anesthesia of one half to two thirds of the corneal surface corresponding to the treated segment of the bulbs. When three fifths of the ciliary region was treated, as much as four fifths of the cornea became anesthetic. For several subsequent weeks this hazy and anesthetic portion of the cornea dried quickly upon exposure. Later the corneal smoothness was completely restored, although in a few cases there were permanent deep nebulous opacities. These, however, may have arisen from the glaucoma. Corneal anesthesia over the segment where it was first observed remained complete and unchanged in all these cases except one, where slight sensitivity returned. Some cases were under observation for more than two years. A number of cyclodiathermies were done upon the upper part of the bulb so that the anesthetic portion of the cornea was protected by the upper lid. This position of the cyclodiathermy did not interfere with a subsequent cataract extraction through an enlarged superiorly located keratome incision under a conjunctival flap in case 19. In case 13, the cyclodiathermy was below, the cataract incision located above.

A uveitis with a cyclitis of variable severity and duration follows the necrosis of the ciliary body and overlying sclera. In this series there was a greatly increased aqueous ray which sometimes lasted for months. However, cells were infrequent in the anterior chamber. Some degree of posterior synechia usually occurred, and a mild iris atrophy was a frequent late finding. A thin membrane formed across the pupillary area of the aphakic eyes. Unless emptied by paracentesis, the anterior chamber usually remained at least partly formed, which is favorable in avoiding peripheral synechia.

Danger of a direct thermal injury to the lens at operation seems improbable. Following any of the usual operations for glaucoma, even when no apparent injury occurs to the lens, cataractous changes are prone to form. With the use of cyclodiathermy a sudden acute fall of intraocular pressure is avoided. A possible danger to the lens exists in its exposure to an extreme hypotony, an iridocyclitis, and to the degenerative products from the tissues destroyed by the diathermy current.

In spite of the destruction of a substantial part of the aqueous-forming structures, some eyes returned to an abnormally high tension when recovery from the operation had occurred and when the

TABLE 1

DATA ON 28 CASES OF GLAUCOMA TREATED WITH CYCLODIATHERMY

Case	Patient Age, Sex	Diagnosis and Previous Treatment	Vision and Tension before Cyclodiathermy	Cyclodiathermy	Results
1.	80 ♂	Eye blind for 7 yrs. Iris atrophic, vascularized.	No light perception; tension 55 mm. Hg	Lower 1/3	4 dys. postoperatively, tension 30 mm.; 3 wks., 21; 2 mos., 16.
2.	59 ♂	Bilateral old retinal separations. Left eye painful, irritated. Mild diabetes.	No light perception; tension 90 mm. Hg	Upper 2/5	1 month postoperatively, tension 35 mm. No pain. Patient died soon after this from uremia.
3.	76 ♀	Acute congestive glaucoma 10 wks. following extracapsular combined lens extraction. Miotics failed.	6/200 (previous to cataract removal); tension 90 + mm. Hg	Upper 3/5	Tension followed for 16 mos. never above 21 mm. Corrected vision 6/7.5 −2; Field, white 3/1000 3 5 8 27
4.	67 ♀	Irritation and pain 10 wks. after right central venous thrombosis. Miotics failed.	Light perception; tension 90 mm. Hg	Upper 3/5	1 wk. postoperatively, tension 42 mm.; 2 wks., 30; 5 wks., 25; 6 wks., 35.
5.	80 ♀	Right eye painful and congested for 10 dys. following central venous thrombosis of unknown duration.	Light perception; tension 90 mm. Hg	Upper 1/2	2 dys. postoperatively, tension 47 mm.; 4 dys., 55; 4 wks., 65; 5 wks., 80. No pain. Light perception.
6.	60 ♂	Left extracapsular lens extraction,* iridencleisis* 4 yrs. previously. Eye painful, congested.	No light perception; tension 90 + mm. Hg	Lower 1/2 (lightly)	2 dys. postoperatively, tension 35 mm.; 3 dys., 23; 3 mos., 55. No pain.
7.	66 ♀	Intracapsular combined cataract extraction* 1 yr. previously. Compensated glaucoma. Miotics failed.	6/10; tension 56 mm. Hg	Upper 2/3	1 dy. postoperatively, tension 21 mm.; 21 mos., 21. Corrected vision 6/10 −2; Field 15 40 15 38
8, 9.	52 ♀	In May, 1942, left acute congestive glaucoma for 33 dys.; right for 4 dys. "Rubeosis iridis." Severe vitreous hemorrhage. Moderate diabetic. Miotics failed.	R., 3/200, tension 90 mm. Hg; L. hand movements at 2 ft., tension 55 mm.	Lower 1/2 of each eye	3 dys. postoperatively, R. tension 40 mm., L. 55; 4 dys., R. 35, L. 40; 6 dys., R. 21, L. 25; 7 dys., R. 15, L. 17. Vision R. 7/200, L. 3/200. 30 dys., hypotony. 5 mos., severe bilateral proliferating retinitis. 6 mos., retinal separations with atrophic changes.
10.	80 ♀	Intracapsular combined cataract extraction* 3 yrs. previously. Moderate bullous keratitis. Miotics failed.	No light perception; tension 40–65 mm. Hg	Lower 1/2	4 days. postoperatively, tension 21 mm. 6 mos., 21.
11.	68 ♂	Incompensated glaucoma 5 wks. after intracapsular combined cataract extraction. Miotics failed.	Light perception (previous to cataract operation); tension 40 mm. Hg	Lower 1/2	Moderately severe postoperative reaction; 1 yr. postoperatively tension 10 mm. Corrected vision 6/30.
12.	55 ♀	Bilateral chronic glaucoma untreated for 9 yrs. Right absolute glaucoma.	R. no light perception; tension 90 mm. Hg	Lower 2/5	Phthisis bulbi. 3 mos. postoperatively enucleated.
13.	75 ♂	Chronic uveitis. Iris congested. No posterior synechia. Immature cataract. Cycloplegics failed.	Hand movements; tension 60 mm. Hg	Lower 1/3	2 dys. postoperatively, tension 40 mm.; 7 wks., 21; 6 mos., 16; 18 mos., extracapsular combined lens extraction. Vision: hand movements.
14.	73 ♀	Acute congestive glaucoma. Trephining* failed.	Light perception, tension 90 + mm. Hg	Lower 1/2	4 mos. postoperatively, tactile tension normal. Light perception.
15.	59 ♀	Central venous thrombosis 1 yr. previously. A painful, congested eye with hyphemia.	No light perception.	Lower 3/5*	Lens changes and posterior synechia. For 1-1/2 yrs. postoperatively, hypotony and free of pain.
16.	69 ♂	Bilateral acute congestive glaucoma. Left basal iridectomy* 2 yrs. previously. Miotics failed.	6/60; L. tension 90 + mm. Hg	Lower 1/2	3 dys. postoperatively, tension 35 mm. 3 wks., 25; 6 wks., 35. For 16 mos., 16–20 under miotics. Vision 6/60; Field, white 7/1000 12 30 12 18
17.	37 ♀	Glaucoma 9 dys. after central venous thrombosis. Moderate incompensation. Blood pressure 226/130.	Finger counting; tension 55 mm. Hg	Upper 1/2*	10 dys. postoperatively, tension 20 mm. eyeball white in 2 mos.; 15 mos., tension 18.

TABLE 1—*Continued*

Case	Patient Age, Sex	Diagnosis and Previous Treatment	Vision and Tension before Cyclodiathermy	Cyclodiathermy	Results
18, 19.	53 ♂	Right chronic simple glaucoma. Trephine* 2 yrs. previously failed. Uncooperative in use of miotics. Left traumatic cataract of 24 yrs. duration. Posterior synechia, exotropia.	6/200; tension 40 mm. Hg Hand movements; tension 40 mm. Hg	Upper 1/2 Upper 1/2	3 wks. postoperatively, tension 16 mm.; 4 wks., 29; 11 mos., 21; 23 mos., 21. Vision 1/200 3 wks. postoperatively, tension 23 mm.; 4 wks., 34; 11 mos., 25 when traumatic cataract was removed through enlarged upper keratome incision and broad basal iridectomy; 23 mos. after cyclodiathermy, tension 30. Corrected vision 6/15 −2. Field white 3/1000 20 / 45 40 / 40
20.	65 ♀	Extracapsular combined right cataract extraction* in 1936, and a later iridotomy* June, 1942. Pain and congestion. Fresh vitreous hemorrhage. Moderate diabetic.	Light perception; tension 30 mm. Hg	Upper 1/2	9 mos. postoperatively, tension 8 mm. No light perception.
21.	73 ♀	Bilateral chronic simple glaucoma. Right eye blind for 7 yrs. Moderate bullous keratitis. Slight congestion.	R. no light perception; tension 90 + mm. Hg	Upper 1/2	5 dys. postoperatively, 41 mm.; 10 dys., 25; 2 mos., 16; 1 yr., 10.
22.	68 ♀	Pain, congestion, iris vascularization, posterior synechia, 8 mos. after central venous thrombosis.	No light perception; tension 90 + mm. Hg	Upper 2/3*	For 2 yrs. postoperatively, comfortable, without pain. Phthisis bulbi.
23.	62 ♀	Intracapsular combined lens extraction* July, 1941. Sept., 1941, tension 40 mm. March, 1942, tension 46. Cyclodialysis,* miotics failed. Eye irritated for 11 mos.	Finger counting; tension 55 mm. Hg	Upper 1/2	2 dys. postoperatively tension. 11 mm.; 2 wks., 13; 2 mos., 29. Corrected vision 6/30. Comfortable.
24.	78 ♀	Bilateral acute congestive glaucoma superimposed upon chronic simple glaucoma. Miotics failed.	Hand movements; L. tension 80 mm. Hg	Upper 1/2 (Left)	1 wk. postoperatively, tension 19 mm.; 5 wks., 12; 2 mos., 48. Vision 6/200. Moderate cataractous changes and posterior synechia. Returned to miotics.
25.	65 ♀	Painful, congestive glaucoma 31 dys. following central venous thrombosis.	Light perception; tension 90 mm. Hg	Lower 1/2*	2 dys. postoperatively, tension 48 mm. Eye injected for 6 mos. Tension 20 or lower for 2½ yrs. Lens cataractous; posterior synechia. Comfortable without treatment.
26.	55 ♂	Internal strabismus, amblyopia ex anopsia. Acute congestive glaucoma. Trephine, miotics failed.	Hand movements; tension 90 + mm. Hg	Lower 2/5	5 mos. postoperatively, hypotony. Phthisis bulbi.
27.	49 ♀	Bilateral chronic simple glaucoma. Trephining* failed. Right acute congestive glaucoma. Miotics failed.	Hand movements; tension 90 + mm. Hg	Lower 1/2	For 16 mos. postoperatively, tension 30–40 mm. under miotics. Vision 6/7.5. White field 3/1000 38 / 35 35 / 38
28.	53 ♀	Anterior uveitis with old central chorioretinitis. Eye painful, congested. Vascularization of iris sphincter. Corneal precipitates. No posterior synechia.	Fingers at 1 ft.; tension 70, after atropine 50 mm. Hg	Lower 1/2	3 dys. postoperatively, tension 23 mm.; 6 dys., 16; 2 mos., 9; 5 mos., 16. Uveitis quiescent. Vision: fingers at 1 ft.

* Operation not performed by author.

I am indebted to Dr. John F. Gipner for permission to include Cases 15 and 22, and to Dr. Charles T. Sullivan for Cases 17 and 25.

tone of the eyeball was reëstablished.

The majority of the cases in this series were in a state of vascular stasis and congestion preoperatively. Following operation, an incompensated phase was not again observed in any of these eyes.

In cases 24 and 27 (chronic simple glaucoma which had become incompensated) there was relief from the acute state but they became stabilized at a glaucomatous level. In these the reelevation of intraocular pressure occurred before the uveitis completely subsided. One is thereby confronted with the problem of whether or not to continue to treat the uveitis in an eye requiring a miotic for the glaucoma.

The operation was most successful in the aphakic group. Tension was controlled in five of the six cases of aphakia that

were secondary to cataract extraction.

The pain, incompensation, and at least part of the irritation were relieved in glaucoma secondary to central venous thrombosis. As the atrophy of the iris became more apparent, the uveitis in these eyes improved. A reduction in the number of new blood vessels upon the iris was not limited to the iris segment corresponding to the treated side of the eye.

Glaucoma with rubeosis iridis in diabetics offers a no less hopeless prognosis. The neovascularization of the iris is a contraindication for intraocular surgery. In the single case (case 8) of rubeosis iridis treated by cyclodiathermy, the tension was controlled, but a later severe proliferating retinosis with an enormous number of new retinal blood vessels led to retinal separation and degenerative changes. Case 28 was a secondary glaucoma with anterior uveitis accompanying extensive vascularization over the sphincter muscle in a distribution similar to that observed in cases of acute rubeosis iridis. There were no posterior synechia. After cyclodiathermy, the congestion and pain disappeared, the tension remained within normal limits, and the uveitis subsided.

In those cases where more advanced degenerative changes were apparent and in absolute glaucoma, the operation tended to hasten the degeneration.

The possibility of the glaucomatous eye containing a neoplasm must always be eliminated.

Conclusions

In every instance where cyclodiathermy is contemplated one should not minimize the damage to the integrity of the eyeball, the unpredictable severity and frequently prolonged period of the postoperative uveitis, nor the uncertainty of a permanent control of the glaucoma. The operation is particularly suited to glaucoma where iris vascularization precludes surgery upon the iris, and to glaucoma secondary to central venous thrombosis. In the latter group, tension was not always controlled, but pain was relieved.

Cyclodiathermy may be chosen as an operative procedure for some desperate cases, wherein already proved treatments for glaucoma have failed. It can be recommended in hopeless cases for the relief of glaucomatous pain in preference to enucleation, retrobulbar injection of alcohol, or to the X ray.

References

[1] Wagner, H., and Richner, H. Zyklodiathermiestichelung, eine neue Glaukomoperation. Schweiz. med. Woch., 1939, v. 69, Oct. 28, pp. 1048-1053.

[2] Vogt, A. Ergebnisse der Diathermiestichelung des Corpus ciliare (Zyklodiathermiestichelung) gegen Glaukom. Klin. M. f. Augenh., 1937, v. 99, July, pp. 9-15.

[3] ———. Die Zyklodiathermiepunkture (Z. D. P.) gegen Glaukom. Klin. M. f. Augenh., 1939, v. 103, Dec., pp. 591-599.

[4] Albaugh, C. H., and Dunphy, E. B. Cyclodiathermy: An operation for the treatment of glaucoma. Arch. of Ophth., 1942, v. 27, March, pp. 543-547.

[5] Duke-Elder, W. S. Text-book of ophthalmology. St. Louis, The C. V. Mosby Company, 1941, v. 3, p. 3396.

STEVENS-JOHNSON'S DISEASE*

A CASE REPORT

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Stevens-Johnson's[1] disease is comparatively rare. It is generally a pediatric problem, but our case occurred in a patient 56 years of age.

The etiology is unknown.

The onset is somewhat acute, with headache, anorexia, chilly sensations, fever, joint aches and pains. A coryza is often associated, and sometimes a mild bronchitis.

There is a moderate to profuse suppurative conjunctivitis.

The skin generally exhibits macules, papules, and vesicles. The buccal surfaces, the palate, the vaginal mucosa and the glans penis, also may exhibit these lesions.

The white-cell count usually reveals a slight leucocytosis.

The disease appears to be self-limited.

Stevens and Johnson[1] in 1922 reported two cases of eruptive fever with stomatitis and ophthalmia. This condition has since been called Stevens-Johnson's disease or syndrome. It is also known as erythema multiforme exudativa, with stomatitis and ophthalmia. Von Hebra[2] in 1866 first described erythema multiforme as a skin eruption of macules, papules, and vesicles upon the face, neck, arms, and legs without marked general symptoms. This more rare type, however, has marked general symptoms, fever, malaise, prostration, and other signs, as well as a severe purulent conjunctivitis and stomatitis.

CASE REPORT

B. B., an American housewife born of Irish parents, aged 56 years, was admitted to the hospital, moderately ill.

She had been married for 35 years and had no children.

The personal and past histories had no bearing on the case.

The onset of the disease occurred about 10 days prior to her admission. At first she noticed a muscular soreness of the legs followed by the appearance of an erythematous rash on the tibial surfaces of both legs. The illness was diagnosed by the patient as la grippe and was promptly followed by nasal congestion, sore throat, and a purulent conjunctivitis, with a free conjunctival discharge. Sulfathiazole to be taken orally was prescribed by a private physician, also moist dressings to the legs and irrigation of the eyes with a saturated solution of boric acid. This medication was begun three days before admission. Because the condition did not improve but became progressively worse, the patient sought admission to the hospital (fig. 1).

Fig. 1 (Jones, Talbot, and King). Lesions on the lips, nose, and eyes.

* From the Department of Ophthalmology of the University of Buffalo, Medical School and Edward J. Meyer Memorial Hospital.

A digest of the hospital record follows:

The admission temperature was 100° F., rectally; pulse 90; respirations 26, there was an eruption on the skin of the tibial surfaces of both legs (fig. 2). These

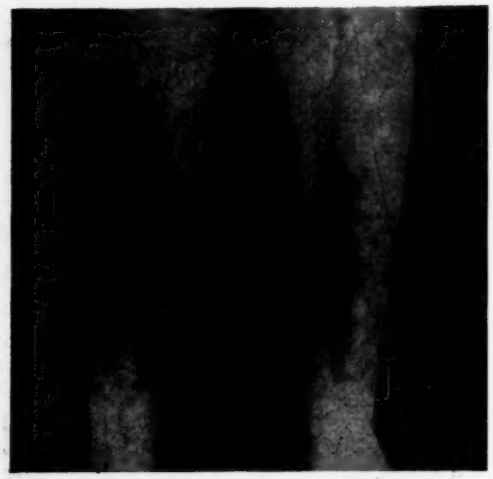

Fig. 2 (Jones, Talbot, and King). Cutaneous lesions on the legs.

lesions were chiefly macular, some were papular, and a few petechial. Some areas were discrete, with normal skin intervening. In color they varied from a bright red to a dusky blue. Other areas were confluent. The lips were dry, cracked, and presented some maculo-papular eruptions with an erythematous areola. Lesions of like character were found at the mucocutaneous junction of the nasal orifices. There was marked crusting of mucus to the point of occlusion of the nasal cavities.

The buccal mucosa also presented some small, raised pustular lesions, and a small pustule was observed on the tongue. There was a foul odor from the mouth.

The lymphatic tissue in the pharynx was hypertrophied. The cervical lymph nodes were enlarged but not tender.

The eyelids were swollen, their margins covered with thick pus, and the cilia were matted together. On separating the lids, the eyeball was found to be smeared with mucopus (fig. 3). The palpebral conjunctivas were turgidly congested exhibiting prominent folicles and small pustular lesions. The bulbar conjunctivas similarly were markedly injected and chemotic with a definite overhanging of a portion of the cornea. The cornea of the left eye presented an old scar about which no history was obtainable. The pupils were moderately contracted and responded adequately in their several reactions.

The iridic structures were not remarkable.

The anterior chambers were not shallow, and the tension was not raised.

The examination of the fundus revealed a moderate arteriosclerotic retinopathy.

The bulbs were sensitive and somewhat painful. The patient complained bitterly of light sensitivity. Visual acuity was markedly diminished. There was no blepharospasm.

No lesions of the vaginal mucosa were apparent.

The symptoms and signs gradually abated. The temperature continued ele-

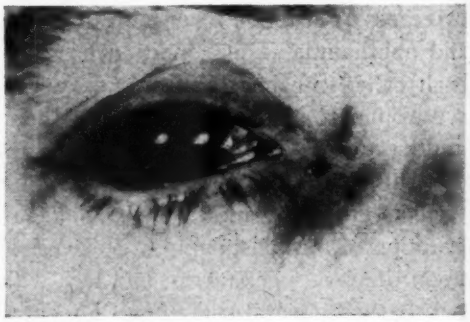

Fig. 3 (Jones, Talbot, and King). Right eye showing marked injection and chemosis.

vated for a period of 10 days, never more than 102°F., rectally.

The pulse remained elevated throughout the course of illness. The respirations were within normal range.

The ocular, nasal, buccal, and cutaneous pathologic processes receded gradually.

Two weeks after admission to the hospital the patient's vision was O.D. 15/40—2, O.S. 15/30—2. The right eye seemed to be more affected than the left. The purulent discharge had subsided considerably; the chemosis had gone. The conjunctival injection although still quite marked did not have the beefy-red appearance of two weeks ago. During her stay in the hospital, on about the third week, the patient became psychotic. A latent paranoid trend was reported by the psychiatrist. The mental picture has not changed up to the present writing.

The ocular, nasal, buccal, and cutaneous lesions have subsided.

Epithelial scrapings from the conjunctival cul-de-sacs showed no inclusion bodies. Nor did those taken from the vagina and urethra.

Cultures of the conjunctival mucopurulent discharge revealed a heavy growth of Staphylococcus aureus hemolyticus. Sedimentation rate was 48 mm. in one hour. The leucocyte count was 15,100; in the differential, the lymphocytes dominated.

The urinalysis was negative as was also the blood Wassermann test. Blood pressure and electrocardiagram were within normal limits. The spinal tap and fluid were not remarkable.

The X-ray studies of the chest, skull, and sinuses revealed no pathologic change.

Penicillin, 2,500 units per cubic centimeter, was used topically in each eye, accompanied by boric-acid eye irrigations and cold moist packs.

Review of the literature

Both cases in the report of Stevens and Johnson[1] were in children aged 8 and 7 years, respectively. There was severe purulent conjunctivitis, fever, malaise, and a fairly generalized skin eruption. In one case the ocular involvement went on to panophthalmitis and blindness in both eyes. In the other case, one cornea cleared completely, a scar remaining in the other eye. Cultures from the nose and throat yielded cocci and bacilli. Cultures from a papule revealed Staphylococcus aureus. Blood culture was negative. There was a mild leucocytosis.

A general blood-stream infection was suspected, without positive evidence.

In 1929 Rutherford[3] wrote a paper on membranous conjunctivitis, which is not within the scope of this paper.

In 1931, J. H. Bailey[4] reported three cases and reviewed the literature on erythema exudativum multiforme for a period of 64 years. He concluded that the disease was caused by some infection of unknown origin and he suggested that the disease was more common than is usually thought to be the case. The quoted references definitely refer to erythema exudativum multiforme, and the fact that the disease may involve the mouth and eyes.

We question seriously whether these references pertain to the Stevens-Johnson disease entity.

Wheeler in 1930[5] saw a case that ended in the loss of both eyes. His case emphasizes the importance of recognizing the disease, and the serious ocular sequelae which may ensue.

Ginandes in 1935[6] reported a case in a child 5½ years of age. His case presented membranes of the palpebral conjunctivas and, in our opinion, does not properly belong in the group of Stevens-Johnson's syndrome.

Edgar and Syverton[7] in 1938 reported two cases in children, aged 12 and 15 years, which showed recurrences and resulted in little ocular damage. These writers were fortunate in having had their cases under observation for a considerable period of time, and investigative work was done on them: A mild leucocytosis was present; blood cultures were sterile, nose

and throat cultures revealed Streptococcus haemolyticus, those from conjunctival and mouth lesions showed Staphylococcus aureus. Biopsy examination of a lesion revealed a mild exudative to a mild inflammatory reaction. Their investigation failed to show the presence of any infective agent in the serum of the vesicular lesions.

There was some thought that an anaphylactic phenomenon was involved.

Givner and Ageloff[8] in 1941 reported two cases, one in an adult 23 years of age, the other in a child of 4 years. These writers were unable to find elementary bodies in the vesicular fluid or to develop a virus on chorioallantoic membrane of the chick.

Murphy[9] in 1944 saw a case in an adult 22 years of age. He expressed no new opinion.

Investigative

We examined epithelial scrapings for some evidence that would point to virus disease. We failed to find inclusion bodies in (1) Daily examination of epithelial scrapings from the conjunctiva, stained by Wright's stain (which also failed to show initial bodies) and (2) in epithelial scrapings from the urethra stained by Wright's stain.

In the fifth week of the disease, 30 c.c. of blood was removed, allowed to stand 24 hours in the refrigerator, then centrifuged and the serum poured off. This serum was sent to Dr. K. F, Meyer, Hooper Foundation, University of California, who examined the serum for the presence of antibodies of the psittacine group of viruses. He reported that the patient's sera fixed compliment in the presence of Psittacosis antigen in serum dilution 1:32 (4 plus) and 1:64 (3 plus).

Discussion

It is now generally accepted that Stevens-Johnson's disease is a definite entity. Duke-Elder[10] classifies ocular erythema multiforme into three groups: I. The catarrhal type, which is a mild type; II. The purulent type, a rare type which is more severe than the catarrhal; III. The membranous type, usually the most severe, and the more common, which often produces serious ocular damage. Type II he calls Stevens-Johnson's syndrome.

We believe that the name Stevens-Johnson's disease should be reserved for those cases which present purulent conjunctivitis, stomatitis, and a cutaneous rash, without the formation of a membrane. We were able to find only 11 cases which seem to fall in this group. Our case belongs in this group.

In Givner's case[8] is found the first report of the disease in an adult.

Our case would seem to have appeared in the oldest patient reported, and it together with two others observed in adults, would definitely indicate that this disease is not confined to the age of earlier childhood.

To avoid confusion as to classification of the disease, it would seem best to continue to apply the name Stevens-Johnson's disease to those cases exhibiting a purulent conjunctivitis, and excluding those with catarrhal or membranous characteristics.

While penicillin was used in the eyes, we have no evidence that it was effective.

Flushing the conjunctival sac and instilling antiseptics may bring about the same result.

Summary

Stevens-Johnson's disease is a rare type of erythema exudativum multiforme. It is a definite entity, and may occur at any age and in either sex. Its etiology has not been determined.

We wish to thank Dr. H. T. Schweitzer for his assistance.

References

[1] Stevens, A. M., and Johnson, F. C. New eruptive fever associated with stomatitis and ophthalomia. Amer. Jour. Dis. Child., 1922, v. 24, Dec., p. 526.

[2] Von Hebra, F. Diseases of the skin. New Sydenham Society, 1866, v. 1.

[3] Rutherford, C. W. Membranous conjunctivitis with loss of eyeballs. Jour. Amer. Med. Assoc., 1929, v. 93, Dec. 7, no. 23.

[4] Bailey, J. H. Lesions of the cornea and conjunctiva in erythema exudativum multiforme (Hebra). Arch. of Ophth., 1931, v. 6, Sept., no. 3.

[5] Wheeler, J. M. Destructive purulent ophthalmia accompanying an eruptive fever with stomatitis. Amer. Jour. Ophth., 1930, v. 13, p. 508.

[6] Ginandes, G. J. Eruptive fever with stomatitis and ophthalmia: A typical erythema exudativum multiforme. Amer. Jour. Dis. Child., 1935, v. 49, pp. 1148-1160.

[7] Edgar, K. J., and Syverton, J. T. Erythema multiforme with ophthalmia and stomatitis. Jour. Pediat., 1938, v. 12, pp. 151-159.

[8] Givner, I., and Ageloff, H. Stevens-Johnson disease with complete visual recovery. N.Y. State Jour. Med., 1941, v. 41, Sept. 1, no. 17, pp. 1762-1765.

[9] Murphy, R. C. An eruptive fever involving the mouth and eyes (Stevens-Johnson's disease). New England Jour. Med., 1944, v. 230, Jan. 20, no. 3, pp. 69-71.

[10] Duke-Elder, W. S.: Text-book of ophthalmology. St. Louis, C. V. Mosby Co., 1939, v. 2, pp. 1733-1735.

CONGENITAL GLAUCOMA FOLLOWING MATERNAL RUBELLA*

Report of two cases

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The timely report of Reese[1] in this country and of Gregg[2] in Australia concerning congenital cataract following German measles in the mother has occasioned widespread interest and has resulted in bringing to light many cases whose etiologic background would have otherwise remained obscure. In these reports as well as that of the National Health and Medical Research Council of Australia[3] other congenital anomalies such as heart disease, microcephaly, microphthalmia, feeblemindness, deafmutism, and hypospadias were found occurring concomitantly with the cataracts, but of all the cases reported only one is said to have had congenital glaucoma. The recent occurrence in the author's private practice of congenital glaucoma in two children whose mothers suffered from an attack of German measles during early pregnancy suggests that such an anomaly may also be a common sequela of German measles, and that careful inquiry into the history of all cases of congenital glaucoma may reveal the rubella taint in many cases. The literature pertaining to this problem has been adequately reviewed by Reese.

Case reports

Case 1. R. J., a boy, 3 years of age, a private patient of Dr. Lee Sutton was admitted to Medical College of Virginia Hospital on January 25, 1945. Delivery had been spontaneous, without undue trauma, and the birth weight was 7½ pounds. Family history was negative except for the mother's having had German measles between the first and second months of pregnancy. From birth the child was mentally retarded. He walked when supported at two years but never learned to talk. A convergent squint had been present from birth as had congenital cataracts. Shortly after birth wandering nystagmus appeared. The child had always been a feeding problem and for the six months preceding hospitalization he had constantly lost weight and strength. In addition, spasticity of the leg muscles was noted, and a constant side-to-side rolling of the head developed. The diagnosis of rickets was made and treatment for this was instituted by the family physician. When, in spite of treatment, the child became progressively more spastic, and decubitis ulcers developed, meningitis was suspected, and the child was referred to Dr. Sutton for diagnosis and treatment.

At the time of admission the following abnormalities were noted on physical examination: Marked malnutrition; congenital cataracts and convergent squint; alopecia areata, occipital region; generalized lymphadenopathy; marked dental caries; questionable Harrison's groove and rachitic rosary; slight tremor of hands; blowing systolic murmer at apex; spasticity of leg muscles; pale mucous membranes; decubitis ulcers over buttocks; weight, 17 pounds.

Except for a severe hypochromic anemia with marked red-cell regeneration and pseudomacrocytosis, and a leucocytosis of 25,000 with myeloblasts, promyelocytes, and occasional normoblasts, the

* Read before the Virginia Pediatric Society on June 8, 1945.

laboratory findings were normal. Skull X-ray studies revealed moderate convolutional atrophy. The diagnosis of congenital idiocy, congenital cataracts, malnutrition, and hypochromic anemia was made and the child placed on a high-caloric, high-vitamin diet. Transfusions were given and ferrous sulfate prescribed for the anemia.

Eye consultation revealed the following changes: The patient followed light. The eyes were microphthalmic. There was a convergent squint of 40 degrees Hirschberg, with wandering nystagmus. Moderate bilateral corneal edema was observed in the central portion, more in the left eye than in the right. The corneas measured 10 mm. The anterior chambers were shallow. The pupils were moderately dilated and fixed; the lenses showed fairly dense nuclear cataracts with clear cortex. The fundi gave a good reflex. The patient was too uncoöperative for detail. Tension was 4+ to fingers. The impression was: 1. Convergent squint. 2. Congenital glaucoma. 3. Congenital cataracts. 4. Microphthalmia.

Examination of the eyes was then carried out under ether anesthesia. A fair view of the fundi was obtained and extreme glaucomatous cupping was found. Fairly dense cataractous changes confined to the nuclear region were also present. Tension with the Schiøtz tonometer (7.5-gram weight) was over 40 mm. in both eyes. An attempt was then made to carry out an iris-inclusion operation on the right eye. Immediately on opening the globe with the keratome, the cornea cleared but when an attempt was made to grasp the iris with forceps it was found to be friable and bound down firmly to the lens so that incarceration was impossible. A modified Lagrange operation was therefore carried out by punching out a portion of the anterior scleral lip with the Castroviejo punch. Following the operation filtration was established and the tension well controlled.

At a later date a similar operation was carried out on the left globe. In this instance, however, little corneal clearing resulted.

Shortly after the last operation the patient developed chicken pox, which necessitated his isolation. In spite of this he improved progressively and when discharged on April 15, 1945, his general condition was much improved and his intraocular pressure was normal to fingers. The patient is to return in the near future for needling of the cataracts.

Case 2. B. C., a white girl aged 3 years, was brought for ophthalmologic attention on April 14, 1945, because of a "large left eye which keeps getting bigger." Birth had been spontaneous, and no abnormalities were noted at that time. Her birth weight was 7 pounds. The family history was negative except for the mother's having had a moderately severe attack of German measles between the second and third months of pregnancy.

About five to six months postpartum, the parents began to notice that the left eye was "getting bigger." Nothing was done about the condition until the child was three years old, when the affected eye had become unsightly. Useful vision had never been present in the left eye.

Physical examination except for the eye findings was entirely negative.

Eye examination revealed the following changes in the left eye. The right eye was normal. Vision, O.D., follows light well. No coöperation for "E" chart; O.S., No light perception. Externally the left eye was prominent and cornea large (14 mm.), with numerous horizontal ruptures of Descemet's membrane. The pupil reacted consensually but not to direct light. The muscle balance was normal. Tension O.S. was 3+ to fingers. The

anterior chamber was very deep; the fundus showed a pale disc, with deep cupping and vessels pushed nasally.

Examination under ether followed by iris inclusion was advised, but the parents have so far refused to allow these procedures to be carried out. An interesting sidelight in regard to this case—and totally without confirmation—concerns the history. The mother stated that at the time she had rubella two of her friends whose pregnancy was of about the same stage as hers also contracted the disease. When they came to term, one gave birth to a "blue baby that died after two days"; the other gave birth to an infant which had "a big eye just like my child's." Since that time the friend whose baby had the "big eye" has moved elsewhere and she has consequently lost contact with her.

Discussion

The clinical evidence at hand allows no modicum of doubt that congenital cataract as well as other anomalies can follow in the wake of maternal rubella. The cry of "post hoc" type of reasoning cannot be raised here, for already cases in this country and abroad are sufficiently numerous to rule out the operation of simple coincidence. When further data have accumulated it may well be that congenital glaucoma will be found to be a more frequent sequela of this disease than is indicated by the report of only one case in the entire Australian series. In that series, while there was only one frank case of buphthalmos, three other cases of corneal clouding, highly suggestive of glaucoma, are mentioned. Since congenital glaucoma, although present at birth, is frequently not diagnosed until later and even then at times diagnosis may be extremely difficult, it is not unlikely that cases from this series have since appeared and will eventually be reported. This is well illustrated by the second case report. In this instance the signs of buphthalmos were not noticed until the child was at least six months old. On the other hand the Australian epidemic may have had a particular penchant for cataract formation whereas other epidemics may result in anomalies of another character.

There has been considerable discussion as to whether or not the maternal rubella responsible for the congenital anomalies cited is the time-honored disease, some variant, or perhaps an entirely new entity. As yet this question also remains unanswered. From reports thus far, though, it appears that the disease responsible is rubella and that only recently have we realized its full potentialities. Indeed there is an old-wives' tale, well known amongst the laity, to the effect that "if a mother has German measles while pregnant it will settle in the baby's eyes." Here again we may find operative the principle that superstitions many times precede medical thought by centuries—as in the case of the old Mosaic law postponing circumcision until the eighth postpartum day when the prothrombin concentration has reached a safe level—only to receive scientific backing in this "enlightened" century.

The question as to what is the best method of handling these cases is an important one. Primarily, our efforts should be expended in preventing maternal rubella by such procedures as strict isolation of expectant mothers during an epidemic and by the use of convalescent serum in those exposed. If, in spite of these measures, rubella develops during the first two months of pregnancy therapeutic abortion should be seriously considered and the prospective mother should be given the facts and allowed to make her decision.

In those instances wherein a defective child has been born the particular anomaly present must be treated. If cataract alone

is present, needling should be carried out as soon as the infant's general condition permits; if glaucoma is present, an iris-inclusion operation followed by massage should be the method of choice, and if cataracts are present, needling should be postponed until the tension is controlled.

SUMMARY

Two cases of congenital glaucoma following maternal rubella during the first and second months of pregnancy are reported.

503 Professional Building.

REFERENCES

[1] Reese, A. B. Congenital cataract following German measles in the mother. Amer. Jour. Ophth., 1944, v. 27, pp. 483-487.

[2] Gregg, N. M. Congenital cataract following German measles in the mother. Trans. Ophth. Soc. Australia, 1942, v. 3, pp. 35-46.

[3] Swan, C., Tostevin, A. L., Moore, B., Mayo, H., and Black, G. H. B. Congenital defects in infants following infectious diseases during pregnancy. With special reference to the relationship between German measles and cataract, deaf-mutism, heart disease and microcephaly, and to the period of pregnancy in which the occurrence of rubella is followed by congenital anomalies. Med. Jour. Australia, 1943, v. 2, pp. 201-220.

HETEROGENEOUS CONJUNCTIVAL TRANSPLANTATION*

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Heterogeneous conjunctival transplantation offers many possibilities in ophthalmology. Great impetus has been given this procedure through the remarkable research of Russian workers in the field of tissue therapy. They have uncovered an entirely new phase of medicine and surgery almost as startling in approach and as breathtaking in scope as the historical contributions of Pasteur and Lister.

One of the foremost of the Russian ophthalmologists, V. L. Filatov,[1] for the past 10 years has been grafting animal tissues, particularly conjunctiva, refrigerated for several days before transplantation. He suggested that the tissues be removed under strict asepsis within 10 hours after death and transferred to a dry sterile bottle which should be kept at a temperature of 2 to 4°C. for seven days. He has shown that at the end of this time any spirochetal infection will have totally disappeared. Substances which stimulate biochemical processes known as "biogenic stimulators" seem to accumulate in these refrigerated tissues, which can be transplanted more effectively than fresh tissue. Filatov has shown that these "biogenic stimulators" occur in many tissues, amongst which conjunctiva is included. The tissues are usually stored with the underlying subcutaneous structures but are freed of excessive elements at the time of transplantation.

Case report. The patient, a man aged 26 years, had incurred a very severe lime burn when he was 12 years old. The eye remained inflamed for several months, the process terminating in a very dense, vascularized corneal scar through which none of the inner structures of the eye could be observed. The upper lid was adherent to the globe, producing a ptosis. Light projection was faulty. The eye was constantly red, somewhat divergent, and teared readily in light. Many vessels ran

* Owing to the author's assignment to overseas duty, his corrected proof has not been available.

Fig. 1. (Rosen). Appearance of the left eye before operation. The adhesion of the upper margin of the tarsus to the eyeball proper makes it quite difficult to evert the lid.

throughout the substance of the cornea, which was somewhat thickened in cross section. The patient was referred from another hospital for enucleation, but because of the adhesion of the upper lid to the globe it was apparent that an attempt at a plastic repair should first be made before enucleation was considered. Oral mucous membrane was at first suggested as transplant tissue but cadaver conjunctiva became available at about this time and its utilization was undertaken.

Local anesthesia was administered (2-percent butyn alternated with 4-percent cocaine) and the adhesion which existed between the upper border of the upper tarsus and the conjunctiva just above the limbus was severed along a horizontal line. Upon completion of this dissection a spindle-shaped defect in the conjunctiva became apparent through retraction and release of the adhesion. The exposed defect was approximately 20 by 16 mm. in area. A similarly shaped piece of conjunctiva was cut out of the donor's conjunctiva. Two anchor sutures of 4-0 silk were placed at the terminals of the spindle, which was turned upon its episcleral surface and then thinned down to a minimal thickness. One end of the spindle was then anchored to the corresponding angle in the eyeball and sutures were inserted along the upper and lower edges with 6-0 silk. The overlapping tissue was trimmed down before the final suturing was made to the external angle of the spindle. The flap was not stretched. Sulfathiazole ointment (5 percent) was placed in the cul-de-sac, following which an alginate substance was poured into the socket which rapidly hardened into a very efficient and rather thick stent. The eye was covered over with a tight pressure bandage which was retained for four days. At the end of five days the alginate stent, which now resembled a rubberlike mold of the conjunctival sac, was removed. The graft appeared to be in good position and of good color. Upon the thirteenth day postoperatively the patient complained of pain in and about his left eye, and it was observed that the right upper lid was edematous. Inspection of the flap showed a hemorrhage beneath the graft. A strong pressure bandage was applied to the left eye for 72 hours. Upon removal of the dressing the edema of the lids and the hemorrhage were seen to have disappeared. On the 25th day there was no indication of any complication, the

Fig. 2. (Rosen). The appearance of the left eye six weeks after operation. The tarsus is no longer bound down to the eyeball and the lid can be readily everted. An upper cul-de-sac is now present.

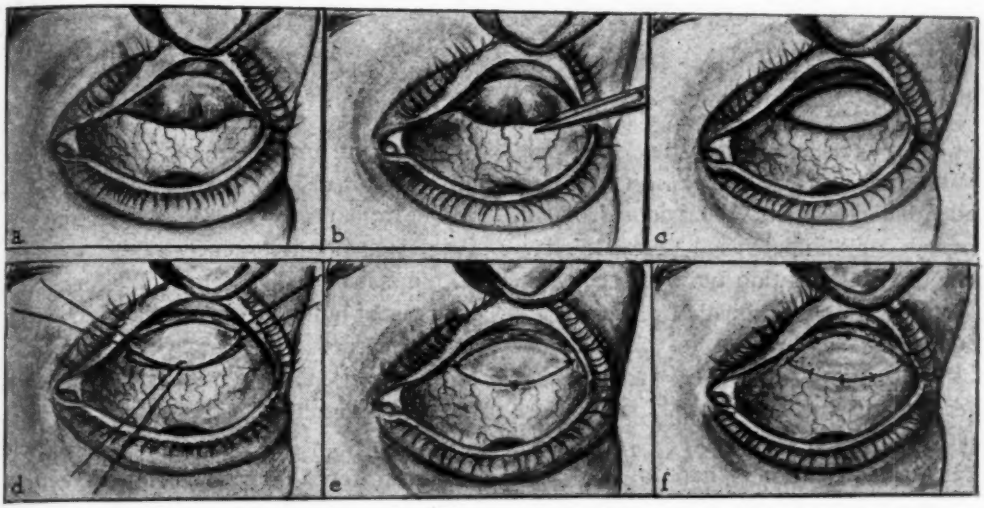

Fig. 3 (Rosen). Steps in the operative procedure. a, Adhesion of tarsus to eyeball. b, Adhesion is severed with scissors. c, Oval defect resulting from retraction of the adhesion. d, Donor's conjunctiva placed in defect left after separation of adhesion. e, Conjunctiva sutured in place. f, Appearance of eye upon completion of operation.

hemorrhage had become absorbed, and there was little indication of the point of attachment of the graft. Five weeks after the transplantation the flap had thinned out, leaving no marked elevation nor scar formation at the site of union of donor's and recipient's conjunctiva. At about this time it became apparent that not only was the transplant successfully adherent but the vascularization and corneal scarification were less marked. The patient thought that he was able to perceive light better than he had prior to the transplantation, although check-up showed that light projection was still faulty.

Although Filatov allows the sutures to remain only 24 hours, in our case they were kept in much longer. Von Hippel[2] had noticed that in many cases a clear corneal graft leads to a clearing of the surrounding leukoma, and upon the basis of these observations Filatov began to use his cadaver cornea, subsequently developing the new field of preserved tissue and its usage.[3, 4]

From this single case report it is conceivable that cadaver conjunctiva in refrigerated and unrefrigerated form may be used for a great many conditions.

References

[1] Filatov, V. P. Amer. Rev. Soviet Med., 1944, v. 2, Oct., p. 53.
[2] ———. In Redhy and Sorsky, "Modern trends in ophthalmology." Butterworth & Co., 1940.
[3] ———. Collected Works of Health Dept., Med. Asian Military Dist.
[4] ———. Arch. Biol. Sci., 1937, v. 50, no. 3.

A CONTINUATION OF THE SCREEN TEST

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Ocular-muscle functions are, as a rule, considered "normal" when a state of so-called balance exists. Variations from the normal, or "imbalance," seem to have achieved classification more often by the extent of the variation than its nature.

"Normals" are not expressions of absolute values but of a vast average measure serving as a basis for comparison.

Discussion of one phase of this subject must take whole functions into account. Clinical proof of the functional value of separate muscles will be wanting because all other contributing actions cannot be rendered known or even constant while the single variable is investigated.

Successful treatment is based upon accuracy of diagnosis and the responsive properties of tissues.

In recent years the screen test has come into constant use because of its accuracy, simplicity, and objective nature. It enables the examiner to define the overactive or underactive eye as well as the particular system involved.

Perhaps the most common varieties of imbalances, influenced by refractive errors, are those of convergence and divergence.

Methods of measurement defining imbalances in these two directions are at variance in regard to terminology rather than actual meaning. Terms defining the nature of muscle action and the measure by which it is taken must be stated. Positions of rest, of fixation, of usual regard, and of maximum function are often loosely applied. Obviously they do not mean the same thing nor do any of these terms used separately and properly give adequate information of imbalance in any given case.

The apparently simple action of convergence and divergence alone is really accomplished by a complex process of action involving all of the muscles. Some are concerned with primary action, some with synergetic action, and others with antagonistic action.

The method of testing ocular-muscle balance offered here was originated in an effort to extend the information given by the usual screen test and to define more specifically the underlying causes of lateral imbalances.

This method offers information with regard to convergence and divergence values and as to whether the anomaly is influenced largely by accommodation elements or is due to inherent inability of muscular response; it also indicates which eye is the greater offender. It shows, moreover, whether the convergence is normal, or if insufficient, whether the divergence faculties are excessive to render the convergence relatively underactive. One eye may tend to overconverge because its fellow does not turn in enough. If the deviating eye is always adjudged the faulty member and treatment is directed toward the reduction of its overactivity, the resultant might well provoke a semblance of balance by reducing the general operation of the complete system of action.

METHOD

The near point of binocular convergence (PpC) is determined and recorded in the usual way.

The patient is now required to fixate the test object, a tiny bulb flash light, brought slowly toward the bridge of the

nose *past* the point previously determined for PpC. This is called the "Light convergence test" and is referred to as the L. C. test.

The normal responses to the L. C. test are that: 1. Both eyes continue to converge maximally when the light has been approached closer than the previously noted PpC and even up to the bridge of the nose, or 2. Most usually, both eyes cease to converge at the same time and hold this position even though the light is continued in its approach, or 3. Both eyes diverge slowly and *equally* to the global midline or very slightly beyond, but to the *same* extent, even though the light is continued in its approach past the break point.

These responses have been noted if the muscles are in balance by other usual tests.

In cases of imbalance a point of approach of the light will be reached where *one* eye will cease to converge and proceed to rapid divergence to the global mid-line or beyond while its fellow continues to hold in the converged position or even continues to converge still more.

The underacting internus of the diverging eye is not yet incriminated as the chief offender, nor is this action always in agreement or compatible with the results of other muscle tests. This is only a step toward evaluation of the contributing muscles in convergence activity.

Conversely, an apparently overacting internus, as defined by other muscle tests, may show underaction by the L. C. test.

In order to reconcile these differences another test was devised known as the "Monocular convergence test," referred to as the M. C. test. The L. C. and M. C. tests complement each other.

The M. C. test is based upon the observation of Donders, well over 100 years ago, that when one eye was screened and a minus lens placed before the free eye, the screened eye turned inward. The minus lens before the free eye induces increased accommodative effort, thereby increasing the convergence.

In Donders's experiment the station of the test object was fixed and the minus lens strength before the free eye was increased.

The M. C. test reverses this procedure in that the test-object distance is varied and the lens strength is maintained constant while the reaction of the screened eye is being observed.

Before any lens is placed before the free eye the test is performed in this sequence:

One eye is screened and its responses noted as the light progressively approaches, just as in the L. C. test. Normally the screened eye will diverge to the global mid-line when the test light reaches a certain proximity. If, however, the screened eye diverges past the gobal mid-line, and when the test light is still quite remote, a minus lens of known strength is placed before the free eye in the effort to restrict the screened eye from diverging beyond the global mid-line. The lens strength is progressively increased until the screened eye stops its divergence when the global mid-line is reached. The strength of the minus lens before the free eye, which is just sufficient in amount to induce the screened eye to hold to the global mid-line, is taken as the measure of accommodative stimulus necessary to maintain normal convergence.

Each eye is tested in the same manner and comparison is then made of the strength of minus lens necessary to limit the screened-eye divergence to the global mid-line area. It must be remembered that the screened eye is the one under test in its failure to converge normally, and that the minus-lens strength is the measure of the accommodative contribution to convergence.

Seemingly contradictory responses occur in the L. C. and M. C. tests in some cases.

Responses to the L. C. tests may show first one eye, then its fellow, to diverge on successive repetitions of test—really an alternation.

Responses to the M. C. test may show variation in the value of the minus-lens strength required on successive visits, but this is the only variation found.

Surprising responses are often noted in testing patients with and without refractive correction.

The cases which do not follow apparently expected rote in view of other, usual muscle tests will be better defined in regard to overacting or underacting systems by these tests.

For example, a case which shows the right eye deviating outward under the L. C. test, suggesting underaction of the right internus, but which shows the left eye deviating outward beyond the global mid-line under the M. C. test, suggesting underaction of the left internus, needs comparison of the strength of minus lens necessary to hold the left eye in restraint with that necessary for the right eye. If, for example, a minus-20 sphere before the right eye is necessary to hold the left eye from deviating beyond the global mid-line, and the left eye requires no lens or perhaps only a minus-10 sphere to hold the right eye to within the global mid-line limit, there would be suggested immediately a tie-up with maximally used accommodation to hold the left eye from diverging beyond the global mid-line. The accommodative stimulus to convergence here is insufficient under usual conditions of use, and the left internus is inherently normal, but is not getting the proper stimulus to function fully. The right eye turns outward on the L. C. test because the left eye is not turning in enough, failing to receive sufficient accommodative stimulus to convergence. Since the L. C. test shows the right internus to be apparently insufficient and the M. C. test the left internus relatively underacting, but actually capable of performing normally, given the proper stimulus, treatment should therefore be directed to the accommodative mechanism of the left eye.

These two tests begin now to define whether the anomaly is influenced by the accommodative element or whether underaction is inherent in the muscle itself and not capable of usual response.

These tests also define whether the convergence is normal or insufficient and the divergence faculties excessive, to render the convergence relatively underactive. They also define which eye is the greater offender in this respect. For instance, the right eye may tend to overconverge because the left eye does not turn in enough and really tends to divergence overactivity. In the effort to maintain parallelism or to achieve convergence, the accommodative stimulus required for left-eye convergence must be excessive, even though the PpA test in this eye is within normal limits, sometimes with a greater positive relative accommodation than normal. This overstimulation of accommodation to convergence is also given the right eye, whose normally functioning internus is still relatively unable to hold the right eye "in" against excessive action of the externus. In true divergence excess alone, not brought about by an accommodative anomaly, no amount of minus-lens strength before the fixating eye will hold the screened eye from diverging widely.

In convergence strabismus or in accommodative convergence excess, the M. C. tests do not always show the action of the interni to be excessive, but may prove it to be normal or insufficient, even though the screen cover test shows

esotropia. A high plus lens is not good treatment, then, for it is not treating the causative agency of abnormal convergence; divergence insufficiency should be sought as the cause. In these cases, recession of the interni only reduces a good function to balance the action of a deficient opposite structure, thereby reducing the value level of the composite function.

The M. C. corresponds more nearly in test to the occlusion-cover in treatment and differs from the screen cover test which measures the response to quick demand.

In patients who still have symptoms of discomfort after refractive correction and in whom the usual balance and PpC are in good order, the L. C. and M. C. tests will show that the relationship of accommodation and convergence has not been properly met. Then, there may be: (1). An accommodative insufficiency remaining or accommodative spasm;* (2). A relative convergence excess remaining, where divergence insufficiency has not been properly met; or where convergence has been discouraged too much by overcorrection of accommodation; or relatively where the accommodation is overused posturally or occupationally, especially if there had been low reserve at first; (3) faulty habits of use still remaining. These cases do well under orthoptic treatment.

There are two main types of convergence insufficiency: 1. Convergence is normally present but lacks proper stimulus by the accommodation. 2. In hyperopic persons normal convergence can be exerted but the accommodation is out of proportion to the convergence requirement and the patient will not or cannot sustain the proper convergence angle.

Refractive attention to these relationships is especially important in the myopic, whose accommodation is not used normally, and in the hyperopic, who needs the proper plus lens to make accommodation suit convergence needs.

The PpA is generally more influenced by the PpC than vice versa.

If the PpC becomes insufficient after refraction or decentration of correcting lenses, the anomaly is not one of accommodative convergence excess and the M. C. test should show abnormal divergence even before refraction. In these cases a full correction of the hyperopia makes the convergence function dependent upon lenses, because the accommodative stimulus to convergence is too much reduced. If the PpC is greater than normal and the M. C. shows normal response, the anomaly is in the muscular convergence mechanism itself. If the M. C. test shows convergence excess in the presence of too great a PpC, then there is a true convergence excess and a full refractive correction is in order; and PpC will not fall below the normal after long use of the correction.

Patients having normal responses to the near tests, but with a high exophoria, tolerate high plus corrections well, since the position of fixation only is at fault.

If the PpC is less than normal (more remote), but the L. C. and M. C. and PpA are within normal limits, the condition is one of accommodative convergence insufficiency and should respond subjectively and objectively to refractive correction to stimulate accommodation.

With a high positive relative accommodation for near the eyes, as a rule, remain maximally converged on M. C. test.

In convergence excess the eyes converge maximally on L. C. and M. C. tests.

* Accommodative spasm does not indicate an excessively strong muscle; rather, it is a sign of insufficient muscular response, and spasm occurs because an attempt is made to answer demands upon it.

If the PpC tests are within normal limits and the near screen test possibly shows esotropia, but the L. C. and M. C. tests show convergence insufficiency, the accommodation is functioning normally within the usual work distance (up to PpC limits) and the fault lies inherently in the convergence muscle structure.

If the PpA is greater than normal and the PpC is low (remote) there usually is an accommodative spasm (increased tonus) to stimulate the low PpC to better effort. The accommodative effort must be greater to stimulate the underacting convergence. For hyperopic persons, the use of a high or full plus correction to bring the accommodative effort to normal for age and decentering the plus lens in to give base-in prism effect, helps the underacting convergence.

In convergence squint or dominance, the M. C. test will probably show that the convergence muscles give a normal response. However, the overconvergence may be responsive to overstimulation in order to counteract an actual divergence-excess tendency. The spontaneous convergence picture binocularly is a symptom rather than a condition. Any treatment designed to lessen the overactive convergence or excess is misconceived if the primary fault is not in the convergence mechanism.

The binocular-test arrangement seems to be the factor that brings out the deviations, for, observed under occlusion cover with correction in place, the dominant eye is most usually straight or follows the direction of gaze of the fellow eye.

Treatment must be directed toward the creation or reëstablishment of usual balance by such means as will stimulate an underacting system to greater responsive actions. Treatment directed at minimizing overactive mechanisms of functional order may produce a semblance of balance merely by reducing the general operation of the complete system of action. Exception to this is in order where stimulation of underaction is subject to mechanical limitations to the extent that balance cannot be effected otherwise.

Merely reducing activity, or understimulating a normal function, is not cogent to a concept of treatment except by "weakening." Reducing convergence excess by high plus lenses, or radically by surgical recession, is not by any means "weakening" a muscle. The true response to such treatment is underaction physiologically, or mechanically, through leverage. Conversely, imposing a minus lens, or resection for divergence tendencies or conditions, does not strengthen a muscle, but merely gives greater advantage to the part in its usual process of function.

Symptoms in muscular anomalies are not proportionate to the amount of variation from the normal. Smaller errors cause a variety of troublesome symptoms while large errors often occasion but little discomfort.

Summary

A method is offered as a continuation of the usually performed screen test, which aids in defining the offending mechanism in conditions of variation from accepted normal balance.

Used with other muscle tests for near, these tests afford information regarding the values of the most important contributors in the combined function of vergence.

The objective nature of the tests permit use upon the uncoöperative patient as well as the very young.

Defining the mechanism to which treatment should be directed offers a safeguard against inducing anomalies of opposite nature, in the attempt to achieve balance.

Majestic Building (3).

NOTES, CASES, INSTRUMENTS

NOTE ON THE INCIDENCE OF CLINICALLY SIGNIFICANT ANISEIKONIA*

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Hanover, New Hampshire

Often it is asked, "How frequently does aniseikonia occur in the general population?" This question is as difficult to answer as would be similar questions regarding errors of refraction or heterophorias. Aniseikonia is as general as are the errors of refraction or the heterophorias, and similarly it can be measured in almost every individual.

The question must be rephrased so as to ask, "What is the frequency of *clinically significant aniseikonia?*"[1] One may say that an aniseikonic error is clinically significant if there is a difference of at least 0.75 percent between the ocular images, and if there are sufficiently severe symptoms associated with the use of the eyes which cannot be attributed to other causes. In such cases we believe that a correction for aniseikonia is warranted. The frequency of clinically significant aniseikonia in the general population is difficult to determine satisfactorily, and so far only estimates have been made, which vary widely.

In an effort to answer the question of the incidence of clinically significant aniseikonia, we are reporting upon the statistics gathered in the town of Hanover, New Hampshire, where the Dartmouth Eye Institute is located. This town, in many respects, offers a satisfactory sample of the population for such a statistical study. It is not near any large city, where some inhabitants would go for eye care; it is a college town, and so a large proportion of its residents use their eyes strenuously, and most of the residents can afford good eye care. All the aniseikonic tests were made in one place and the data for a 15-year period are available. Although all inhabitants who had general eye care were not seen at the Institute†, a large proportion of them were examined here. Obviously, Hanover is not typical of rural or industrial communities. Furthermore, since the work originated here, the community is probably more conscious of aniseikonia than would be the people of some other town.

TABLE 1

DISTRIBUTION OF HANOVER RESIDENTS EXAMINED FOR ANISEIKONIA FROM 1929 TO 1943

Year	Patients		Training Subjects	
	No. Examined	No. Given Aniseikonic Corrections	No. Examined	No. Given Aniseikonic Corrections
1929	6	4	4	2
1930	6	2	3	1
1931	11	3	1	1
1932	14	10	2	1
1933	8	3	0	0
1934	21	11	8	3
1935	33	17	10	4
1936	94	42	4	1
1937	37	16	10	4
1938	35	12	11	2
1939	15	5	5	2
1940	10	2	16	1
1941	15	3	215	6
1942	8	4	79	2
1943	7	1	11	1
Totals	320	135	379	31

* From the Clinical Division of the Dartmouth Eye Institute, Dartmouth Medical School.

† Until the onset of the war the local clinic (Hitchcock Clinic) had one eye specialist who provided general eye care for a large number of Hanover residents. Also, a few of the residents undoubtedly consulted optometrists in neighboring towns.

This report of aniseikonic examinations pertains only to the permanent residents of the town and does not include any of the college students. Two groups of patients must be distinguished in the study: those who came to the Institute at their own initiative because of ocular symptoms, and those who volunteered as subjects in the training courses for aniseikonic clinicians. The majority of the latter group had no symptoms.

From 1929 through 1943, 699 Hanover residents were examined for aniseikonia. The number examined in the two groups, as well as the number for whom aniseikonic corrections were prescribed is given in table 1. The population of the town has been taken as 3,234, which is an average of the population figures given by the United States Census for the years 1930 and 1940. This figure includes about 700 children, of whom very few were examined for aniseikonia.

Thus, 699 Hanover residents, or about 21 percent of the population, were given aniseikonic tests. Of these, 320, or 10 percent of the population, were regular aniseikonic patients; while 379, or 11 percent, were subjects used in the training courses. Of the regular patients, 135 were given aniseikonic corrections. This represents 42 percent of the patients examined, or about 4 percent of the total population. Of the subjects used for practice and demonstration in the training courses, only 31, or 8 percent, were given aniseikonic corrections; and this is about 1 percent of the total population. Thus, 166, or about 24 percent of the 699 persons examined, were given aniseikonic corrections. The 166 individuals given aniseikonic corrections represent about 5 percent of the population of the town.

A recent study[2] of the results obtained with 2,115 patients given aniseikonic corrections indicates that about 70 percent of the patients experienced complete or partial relief of their symptoms. This is in good agreement with the figures published by several previous observers.[3] If in the classification of *clinically significant aniseikonia* we include only those patients whose symptoms were relieved by aniseikonic correction, the percentage of the population of Hanover having clinically significant aniseikonia is 3.5 percent (70 percent of the 5 percent of the population who were given aniseikonic corrections).

Summary and Conclusions. In an attempt to answer the question of the incidence of aniseikonia, a study has been made of the clinical data in the town of Hanover, New Hampshire. The results were as follows:

Average population, 1930-1940—3,234.
Total number of residents examined—699, or 21 percent of the population.
Number of regular patients examined—320, or 10 percent of the population.
Total number given aniseikonic corrections—166, or 5 percent of the population.
Estimated number of patients benefiting from the aniseikonic corrections—116, or 3.5 percent of the population.

These figures may not be representative of other communities, and the improvement in the technique of measuring aniseikonia, the simplification in instrumentation, the reduction in examination time and in the cost of aniseikonic lenses may bring about less conservatism in the examination for, and the prescribing of, aniseikonic corrections. Post[4] stated: "Thus the aniseikonic clinics have become the rendezvous of the most difficult patients for whom to obtain comfort. That anything good is accomplished for these patients is the miracle." He recommended that the tests for aniseikonia be simplified so that the examination time could be

shortened, and also advised that the cost of the lenses be reduced. These are the current aims of the Dartmouth Eye Institute, and it is hoped that once they are realized the incidence of clinically significant aniseikonia will be studied again.

4 Webster Avenue.

References

[1] Burian, H. M. Clinical significance of aniseikonia. Arch. of Ophth., 1943, v. 29, p. 116.

[2] Bannon, R. E. and Triller, Wendell. Aniseikonia—a clinical report covering a ten year period. Amer. Jour Optom. and Arch. Amer. Acad. Optom., 1944, v. 21, May, pp. 171-182.

[3] a) Berens, Conrad. A study of 288 patients examined with the ophthalmo-eikonometer. Brit. Jour. Ophth., 1937, v. 21, March, pp. 132-142. b) Hughes, W. L. Aniseikonia in emmetropia. Amer. Jour. Ophth., 1937, v. 20, Sept., pp. 887-890. c) Fisher, H. M. An analysis of statistical data on aniseikonia. Trans. Amer. Acad. Optom., 1938, v. 12, pp. 52-55. d) Berens, Conrad, and Loutfallah, Michael. Aniseikonia—a study of 836 patients examined with the ophthalmo-eikonometer. Amer. Jour. Ophth., 1939, v. 22, June, pp. 625-641. e) Doane, H. C. Analysis of clinical data on aniseikonia with case reports. Amer. J. Optom. and Arch. Amer. Acad. Optom., 1941, v. 18, Sept., pp. 393-403. f) Hicks, A. M. Aniseikonia—a review of 200 consecutive cases examined on the eikonometer. Arch. of Ophth., 1943, v. 30, Sept., pp. 298-311.

[4] Post, L. T.: The future of aniseikonia. Amer. Jour. Ophth., 1943, v. 26, March, pp. 321-322.

SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

January 8, 1945

DR. MILTON L. BERLINER, *presiding*

DARK VIOLET LIGHT FOR MICROSCOPIC INSPECTION AND PHOTOGRAPHY

DR. ERNEST METZGER has been using this method as a diagnostic aid since 1924. It is applied with or without a fluorescein solution. He demonstrated the normal fluorescence of the clear lens and the appearance of pigment and fat in the anterior segment of the eye. He also presented stereoscopic photographs of the eye taken with this light.

CAMPIMETRY WITH ULTRA-VIOLET LIGHT

DR. GEORGE KLEEFELD demonstrated visual-field testing with ultra-violet light. In campimetry, and especially stereo-campimetry, fluorescent targets together with fluorescent markings on the posterior surface of the perimetric arc permit the determination of the fields of vision in darkness. The delimitation of the blind spot is unusually accurate by this technique.

VISUAL EXERCISES IN OPHTHALMOLOGY

DR. JOSEPH I. PASCAL presented a paper on this subject. His theme was that visual exercises, using the term in the broadest sense, are bound to form a larger part of ophthalmologic practice in the future than at present. Starting with exercises to improve the visual acuity in an amblyopic eye, he stressed the fact that the resulting improvement is largely due to the psychic phase of vision. The process of training is largely educational, teaching the mind to make better responses. An extension of this procedure is to teach the mind to appreciate better nonfocused retinal images. This can be done to a certain extent, although the procedure is overexploited by some nonmedical practitioners. The principles underlying these exercises involved the application of movement, color, and some bodily activity.

He spoke of exercises for (1) the improvement of peripheral vision and its importance; (2) improving color perception in the light of established facts; (3) improving the rate of reading; and (4) improving the speed and span of the visual act. The latter is in line with the modern psychologic concept, the so-called "Gestalt psychology" which postulates that we learn by "synthesis" rather than by "analysis."

Dr. Pascal then reviewed the exercises for improving neuromuscular coördination of the eyes in the act of binocular vision. He mentioned the red-glass test as a means of judging whether or not any neuromuscular incoördination requires immediate attention or not. For these exercises he stressed the fact that they can be given without elaborate apparatus, if need be. Simple prisms will provide rhythmic or sustained exercises, sometimes by means of the step method, sometimes the sliding method, or a combination of these. Variety and interest are all important. In addition, even the use of a simple stereoscope will help greatly, especially if it is used with the Pointer method, which, he said, he described some 12 years ago.

As not many ophthalmologists may be fitted by temperament to engage in this

work directly, since it is largely in the nature of teaching, Dr. Pascal suggested the employment of trained orthoptic technicians. These technicians are usually women, have more tact and patience for teaching elementary skills and are most suitable to administer these various exercises under the supervision of the doctor.

Discussion. Dr. James W. Smith asked for more information regarding exercises in color-blind patients. Men, rejected for military service for this reason, inquired about a clinic in Brooklyn which could cure their defect. An editorial in the J.A.M.A. of June 5, 1943, stated that the claim of the optometrist Lepper of an alleged cure for color blindness was unwarranted and that he was conducting an educational rather than a therapeutic process. An intelligent patient can memorize the plates used in the Ishihara test. One color-blind patient seen by Dr. Smith even trained himself to give the correct answers for the pseudo-isochromatic plates if they were presented to him in regular sequence. However, if half of the plate was blocked out or turned upside down, the patient's answers were again those of a color-blind individual. Dr. Pascal has been discussing temporary color retraining rather than visual exercises.

Dr. Daniel Rolett acknowledged the importance of visual training in the amblyopias or for poor development of the visual sense or reading ability. However, a patient of his, rejected by the Merchant Marine because of color blindness, attended a private clinic in Brooklyn to cure this defect and then applied for admission to the Marines where he was accepted. He returned to see Dr. Pascal, who presented to him the Ishihara test, all numbers of which he read easily. However, when shown an old set of German plates he was unable to read them and admitted having memorized the Ishihara chart. Another patient went through this same "training" with the same effect.

Dr. Morris Jaffe said he considered the retraining of diminished visual acuity and defects of color perception fraught with dangerous possibilities. He described a patient with primary optic atrophy associated with cerebrospinal syphilis. The patient and his wife were informed of the poor prognosis and were advised that he should learn Braille and have occupational training to become self-supporting. Instead, Christian Science healing was undertaken. Six months later, when the patient was reëxamined the findings were unchanged, but he and his wife were certain that his vision was restored and proved the point by telling exactly the time on a clock on a bookcase. However, when the hands of the clock were pushed back a half hour, he could not tell the changed time, nor could he count fingers at 12 inches. The patient had adjusted himself to his condition, but still could not see the physical world about him. He later admitted he would be happier if he could learn some useful work.

The psychologic approach of reëducation to enhance visual and color preception will only stimulate charlatanism from those who have no adequate specialized medical training in the field of ophthalmology. This therapeutic aid, as suggested by Dr. Pascal, must be received with caution and critical judgment.

Dr. Pascal concluded by stating that he had not done much work in the field of retraining of color vision but has been in correspondence with people who have and for whose honesty he can vouch. They have obtained results not explained solely by memorizing. Many of their patients have acquired a system of recognizing colors, probably in some other manner.

The methods vary with different men. One merely has to impress upon an individual a certain color. One method, as a starter, is to show the individual three primary colors in bright saturated discs and let him look at them intently until he can recognize each of them by name. The training cards are then reduced in size and brightness and some explanation of "shades" and "tints" is introduced. There is more to this process than memory.

Dr. Pascal said he had no experience with the use of vitamin A in color rehabilitation, but greatly doubts its efficacy except where there is a general systemic lack of vitamin A.

Regarding improvement of visual acuity by training, the case of an 18-year-old girl was described. She had been given exercises in order that she might stop wearing glasses which were given her at the age of 9 years and which she managed to do without most of the time. On the Snellen chart the uncorrected vision was between 20/30 and 20/40. Objective examination indicated about 2 diopters of myopia and subjectively, on unfamiliar picture charts, the visual acuity corresponded to the refractive error. Nevertheless, she read 20/30 to 20/40 on the conventional charts. Her sight for things about the room was definitely better than that of a person with 2 diopters of myopia who regularly wears glasses and then removes them. In other words, this was an individual who disliked wearing eyeglasses, wore them only occasionally, and consequently trained herself to see fairly well without glasses even before she went to this practitioner for special aid.

Dr. Pascal agreed that charlatanism is indeed a problem and that this field, like all new fields, is apt to be exploited. It is therefore important for ophthalmologists to investigate it and adopt whatever is of benefit in their work.

Practical points in prescribing bifocals

Dr. Arthur Linksz said that comfortable near vision through bifocals depends on more than proper refraction and the choice of an adequate reading addition. Habits, occupation, and number of optical and mechanical factors must be taken into consideration. The optical properties of some bifocals were described and it was pointed out that Benjamin Franklin's original bifocal, although cosmetically undesirable, is at the same time optically one of the best types yet devised. The prismatic effect, because two separate lenses are used, is very low and there is no distortion nor color difficulty in the reading portion.

One of the most widely used bifocals today is the one-piece variety. The so-called "A" one-piece bifocal is an excellent lens and may be used with strong plus lenses and with weak additions; the optical center of the reading portion is about 8 mm. below the distance center. When a minus lens is worn, there is a great base-down prismatic effect with this bifocal, and on looking through the lower portion the floor seems far higher than it should. In these cases a "B"-type segment is called for, and this, with its small radius of curvature, and higher center of curvature, will minimize the displacement. Formulas were presented for making the various calculations regarding these lenses, their size, and the location of their optical centers.

Discussion. Dr. Joseph I. Pascal pointed out that the Franklin bifocal is a single-center lens, the two components being divided along the optical centers, which are placed adjacent to each other. The idea of having the optical center of the upper part 4 mm. above the dividing line, and the optical center of the lower part 4 mm. below the dividing line came in

long after Franklin's death. The latter bifocal is a bicentric bifocal, whereas the original Franklin lens was monocentric. Probably if Franklin had invented a bifocal lens with two optical centers, bifocals would not have been so rapidly adopted. The important point is that his lens had only one optical center, so that the image of any object was always formed along one axis. This is the real point, image formation along one principal or secondary axis. Dr. Linksz discussed only one lype of bifocals, probably for lack of time, but there are, of course, many other types, fused bifocals, and so forth.

Dr. Linksz agreed that the original Franklin bifocal had only one optical center but had not discussed the lens because of time limitations. He emphasized that this two-piece type of bifocal can be made with two optical centers, each in its proper place and so be free of prismatic effects. The so-called "jump" caused by bifocals with two optical centers instead of one, is no disadvantage, and in fact is never noticed by the patient, as the eye does not register while moving over the dividing line. The original Franklin bifocal with one optical center, while free of "jump" has a prismatic effect both at the far and reading points. Bifocals should be constructed so as to have optimum optical properties 4 to 6 mm. above and below the dividing line. While there was no time to discuss fused bifocals, the various mathematical considerations presented are valid both for the fused and one-piece types.

Examination and correction of astigmatism

Dr. I. S. Tassman said the examination should commence with an accurate history and a careful analysis of the complaints with consideration of the subjective symptoms, age, and occupation; then these factors should be evaluated as to their connection with a possible refractive error. Headaches should be studied: their situation; whether they appear during the day, especially while the patient is at work or at school. Panoramic headache should make the examiner consider asthenopia. When determining the visual acuity, note which letters are correctly called and which are miscalled; these give an indication as to the type of refractive error.

In all cases with active accommodation a cycloplegic should be used. Atropine, 1-percent solution, and paredrine, 1-percent solution, are used for children; after 13 years of age, homatropine, 2-percent, and paredrine, 1-percent, are used. In performing the retinoscopy, examine the central area by having the patient gaze at the light; children should keep their heads straight. Neutralize first one principal meridian to convert the error to simple astigmatism and then use a cylinder to neutralize the remaining band of light. A subjective examination should follow the objective test. All cases in which a cycloplegia is used should have a postcycloplegic examination, at which time the strength of the sphere may change; the strength and axis of the cylinder is not frequently changed. The use of a cross cylinder is helpful in accurately determining the axis.

If an older patient is receiving his first cylindrical correction, when the latter is of a high degree it may have to be reduced; children are given the full strength. The fitting is important, especially for high cylinders, oblique axes, and for the presbyopic subject wearing bifocals.

Discussion. Dr. J. H. Bailey disagreed with the claim that the combination of paredrine and homatropine produces greater cycloplegia than homatropine alone. He believes that under like condi-

tions the cycloplegia produced by 5-percent homatropine solution is not increased by the addition of paredrine.

Paredrine is a sympathomimetic drug, and, as such, must be an exciter or an inhibitor of certain smooth muscles. It is asserted that paredrine acts upon the ciliary muscle in a manner analogous to its action on the dilator pupillae, which, in turn, postulates a dual innervation of the ciliary muscle, sympathetic longitudinal fibers (Bruecke's muscle), and antagonistic parasympathetic circular fibers (Mueller's muscle). The longitudinal component supposedly causes flattening of the lens, rendering the eye hypermetropic whereas the circular component increases the curvature of the lens, adapting the eye for near vision.

In the first place sympathetic fibers going to the longitudinal muscle cells have not been isolated or identified. Secondly, it is very much disputed that sympathetic excitation by stimulation of the cervical sympathetics results in a flattening of the lens. Furthermore, the word cycloplegia connotes a relaxation of the entire ciliary muscle and not one part contracted and the other part inhibited.

Static refraction means the refraction of the eye in repose. Obviously if paredrine excites a part of the ciliary muscle, the eye is not in repose from the standpoint of refraction. Furthermore, the procedure usually performed to determine the residual accommodation, which, in turn, is the measure of the adequacy of the cycloplegic, leaves much to be desired. The examiner should make an allowance for such factors as the mydriasis, the angle subtended by the test object, and the several psychologic variables. The ophthalmologist must also bear in mind that the extent of the cycloplegia is influenced by the nature of the vehicle containing the drug. Homatropine is usually prescribed in a watery solution, while the combination of homatropine and paredrine is prescribed in a more favorable menstruum conducing to its greater concentration in the aqueous chamber and thus enhancing its effect.

Dr. J. I. Pascal agreed with Dr. Tassman in his insistence on accuracy and exactness in astigmatic corrections, provided the physiologic nature of the problem is not forgotten. In dealing with a living dynamic organ the degree of mathematical exactness must be commensurate with physiologic variations. Even if the astigmatism is corrected with theoretical precision, there are still intrinsic variabilities in the astigmatic correction which cannot be eliminated.

Dr. Tassman concluded by stating that paredrine is effective as a cycloplegic only when employed with homatropine and atropine, and does enhance their value. Paredrine is not of itself a cycloplegic and even homatropine has been said at times to be unsatisfactory when used alone. The innervation of the ciliary muscle is a large subject and one which is still discussed.

The refractionist should try to obtain a mental picture of the patient's condition, particularly with reference to the accommodation. There are, of course, several different ways of measuring the accommodation; this should be satisfactorily estimated and, if residual accommodation remains, its extent should be known and taken into consideration. There should be an attempt to determine the extent to which the symptoms are caused by the astigmatism present, by the activity of the accommodation, and the occupation of the patient. These three factors together with the age must all be considered in order to prescribe a correction which will provide the relief that the patient seeks.

USE OF MYODISC LENSES IN THE POST-OPERATIVE TREATMENT OF RETINAL DETACHMENT

DR. ERNST L. METZGER stated that the Lindner pinhole spectacle with its 3-to-5-mm. peephole results in a very limited visual field. The return of a patient who has been operated on for detachment to normal life is facilitated if, after he has worn the stenopeic spectacles, myodisc lenses with the smallest diameter available are used. They are less conspicuous than the stenopeic spectacles and prevent excess rotation of the eyes for a much longer period after the operation. The patient is more willing to wear them; some patients, in fact, do not return to the use of the usual lens at any time. To be effective, there should be a difference of from 6 to 10 diopters between the central corrected portion of the lens and the peripheral flat part. A hook-on addition is prescribed for the presbyopic patient.

Leon H. Ehrlich,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

January 15, 1945

DR. SAMUEL J. MEYER, *president*

FIRST ANNUAL SANFORD R. GIFFORD MEMORIAL LECTURE

THE PATHOLOGIC PHYSIOLOGY OF CONVERGENT STRABISMUS

DR. FRANCIS HEED ADLER presented a paper on this subject.

CLINICAL MEETING
(Given by the Department of Ophthalmology, Northwestern University)

CENTRAL MYOPIC DEGENERATION OR CENTRAL RETINAL VASCULAR DISEASE

DR. HELEN HOLT said that Mrs. B. H., aged 50 years, had experienced sudden loss of vision in the right eye on November 23, 1944. No general symptoms were associated nor was there ocular pain. On December 14, 1944, when seen in the Clinic, the corrected vision was R.E. 10/200; L.E. 20/70. In 1941, with the same correction (R.E. -2.25D. sph. $\bigcirc\!\!\!\!\bigcirc$ $+1.00$D. cyl. ax. 155°; L.E. -12.00D. sph. $\bigcirc\!\!\!\!\bigcirc$ $+2.00$D. cyl. ax. 75°) the vision was R.E. 20/25−3, L.E. 20/40. At that time the right eye was normal and the left had a posterior staphyloma, myopic degeneration, chorioretinitis, and a stellate cataract on the surfaces of the adult nucleus.

On examination there was found a large retinal and preretinal hemorrhage in the macula of the right eye. During the following weeks this gradually cleared, leaving a gray elevated area in the macula, about 2 to 3 disc diameters in size, surrounded by a crescent-shaped hemorrhage. All tests for foci of infection were negative. Peripheral arteries showed Grade-II angiospasm. Chorioretinitis was ruled out, and the differential diagnosis between myopic central degeneration and central retinal angiospasm was considered. Since the changes occurred in the eye with the mild myopia, the first etiology seemed less likely. The elevation of the lesion with edema and peripheral angiospasm led to the choice of central retinal angiospasm or vascular disease as the etiology. Treatment with depropanex was continued, but the vision did not improve beyond 20/200.

POSSIBLE PARTIAL CLOSURE OF THE CENTRAL ARTERY

DR. HELEN HOLT said that Mr. P. P., aged 60 years, had been treated in the medical clinics for mild arteriosclerosis obliterans from August, 1944, until December 6, 1944, at which time he was ad-

mitted to the Eye Clinic. Twenty-four hours previously, while sitting, the vision of the left eye blotted out. There were no associated symptoms. Visual acuity was R.E. 20/25, L.E. 10/200. Blood pressure was 160/92.

External examination revealed no abnormalities, and both fundi appeared normal except for questionable narrowing of the arteries. Fields showed a 20- to 40-degree central scotoma in the left eye. Vasodilators, papaverine by mouth, and intravenous typhoid vaccine were administered, with no improvement in visual acuity or fields. On January 9th, very slight pallor of the disc of the left eye was observed, and a slight enlargement in the central scotoma was elicited. A diagnosis of partial occlusion of the central retinal artery of the left eye in an individual with early Group-I arteriosclerotic retinopathy was made.

Deep tuberculous keratitis treated with beta emanation

Dr. Helen Holt said that Mrs. D. McQ., aged 31 years, suddenly complained of a foreign-body sensation in the right eye during a routine eye examination on September 30, 1944. No pathologic change was found. She returned on October 18th, when the eye was slightly injected and there was considerable photophobia. Corrected visual acuity had dropped from 20/25 to 20/40. Ciliary injection was present on the nasal side of the cornea and gray infiltrates extended into the cornea from the limbus for a distance of 2 mm. on this side. Folds in Descemet's membrane were numerous, but no vessels were present. A diagnosis of deep keratitis was made.

Wassermann and Kahn tests had been negative prior to two pregnancies; the last cesarean section was performed about 15 weeks prior to the onset of the eye symptoms. The tuberculin test was positive and tuberculin therapy was instituted. Locally, atropine and heat were advised. The lesion progressed steadily until the entire cornea was gray, and all of Descemet's membrane was involved. The cornea remained avascular except for one deep vessel at the 3-o'clock position, extending in about 2 mm. Vision was reduced to perception of hand movements. On October 23d an X-ray treatment was given, and beta-emanation therapy on October 30th, November 6th and 27th. On November 21st definite improvement was noted, and the infiltrates gradually faded from the periphery inward. On January 8th only a small gray area above the center of the cornea remained, and the corrected visual acuity had returned to 20/25.

Tuberculous keratitis

Dr. Beulah Cushman presented Mrs. A. S., aged 34 years, who had been under antisyphilitic therapy. On September 16, 1944, she was referred for an eye examination because of pain and photophobia in the left eye. Vision was 20/50, corrected. A corneal ulcer was found superimposed on an old corneal scar which had been presumed to be interstitial keratitis. In spite of treatment with atropine, vitamins, and cauterization the area continued to break down, and fresh infiltrates persisted beneath Bowman's membrane. On October 13, 1944, a positive skin reaction to purified protein derivative was obtained and tuberculin therapy was instituted. This was continued, with gradual healing of the lesion. Ciliary injection and corneal vascularization disappeared and a gray nebular scar occupying the upper central portion of the cornea remained. The corrected visual acuity was 20/50+3.

Robert Von der Heydt.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

SECTION ON OPHTHALMOLOGY

January 18, 1945

DR. WARREN S. REESE, *chairman*

ACQUIRED PTOSIS, CLASSIFICATION AND CORRECTION

DR. EDMUND B. SPAETH presented an analysis of over 200 patients in whom an acquired ptosis was either the sole complaint, or ptosis appeared as a part of the symptom complex of the underlying condition. From these cases a classification was developed based upon anatomic and etiologic characteristics. Instances of each subdivision were shown with lantern slides.

The varied surgical means for correcting these different conditions were presented. All forms of symptomatic ptosis are not surgical conditions. Those, however, which are such, need individual attention depending upon the underlying characteristics of the case under consideration. (See this Journal, October, 1945.)

Discussion. Dr. James S. Shipman said that Dr. Spaeth had shown a great number of cases of ptosis that many never thought occurred. Usually ptosis is considered a congenital condition which can be corrected by one of many different operations, and the reason that there are so many different operations for ptosis is that none of them are perfect.

Dr. Spaeth demonstrated that ptosis does occur after birth, due to many causes, and is not by any means always congenital. Before operating on any patient with ptosis, one should first determine whether or not the condition is congenital in origin. If it is a case of acquired ptosis, what is the reason for it? What is the pathology? Unless this investigation is made, difficulties may arise that otherwise could be avoided. Certainly in ptosis due to syphilis or myasthenia gravis, one does not wish to try operative intervention. There are many pitfalls that one is liable to fall into by being too quick to operate for ptosis. Make sure first of the diagnosis as to the reason for ptosis, and, when that is decided, then with due consultation, plan a procedure that will relieve the ptosis. As Dr. Spaeth showed, the operative principle used in correcting acquired ptosis is very much the same as that used in correcting congenital ptosis. The cause, the scar tissue, and the pathologic change present, however, modify a great deal the technique that is to be followed.

Included in the cases presented by Dr. Spaeth were some which Dr. Shipman had referred to him. He particularly wished to mention the case of the woman who had a pachydermatocele. There was an enlarged eyelid that hung down on her cheek, and the eye protruded out to the cheek also. He said she had one of the worst looking eyes he had ever seen. When last examined she had a good socket, and a well-fitted artificial eye. He said he had assisted Dr. Spaeth in one stage of the operation in which the dura was uncovered in the roof of the orbit. This was a very difficult case to follow through, requiring a great deal of patience and skill, and more than the average amount of boldness to bring this woman's face to a normal appearance.

REVIEW CONCERNING ABERRATIONS OF THE EYE

DR. ALFRED COWAN said that Thomas Young, as early as 1801, showed conclusively that the eye was neither achromatic nor aplanatic. Many others, particularly Volkman, Donders, J. H. Knapp, and Tscherning, investigated the aberrations of the eye; but the most thorough study of the actual image of the eye was made

by Gullstrand. He found that the caustic surface is extremely intricate, and that it varies as the meridian section is revolved around the axis.

In the eye there are not only all the aberrations which must be eliminated in a well-designed artificial optical instrument, but the added faults that exist in a living asymmetric organ.

The aberrations of the eye are physiologic, and their absence would be of no use for the eye. The effect of the circle of least confusion is that of a point image as long as its diameter does not exceed the revolving power of the eye. The retina is sensitive to distinct visual acuity only in a very small area at the fovea, and for this reason only that part of the caustic which is found most useful is utilized. The surrounding halo is disregarded. Also, because of the peculiar structure of the retina, the effects of marginal astigmatism, curvature of field, distortion, and so forth, are negligible. The faults of the optic system of the eye do not interfere with distinct visual acuity.

Discussion. Dr. Francis Heed Adler said that this paper indicated fair-mindedness in at least one physiologic opticist. The majority seem to have such faith in geometric optics that they are like an economist who willfully blinds himself to the frailties of human nature in order to believe wholeheartedly in the doctrines of Karl Marx. They insist on speaking of point image on the retina, although they know they do not exist. This has seriously retarded the knowledge of visual physiology, and Dr. Lancaster is quite right in emphasizing the importance of learning about image formation in the eye as it occurs in nature, and not as it is pictured in geometric optics. He agreed with Dr. Cowan that geometric optics should be taught as the basis for physiologic optics, but the student must be carried beyond this, and instructed in image formation as it actually occurs in the human eye.

Dr. I. S. Tassman commended Dr. Cowan for pointing out the benefit of retinoscopy in at least obtaining an approximate determination of the refractive state.

It seemed to him that in recent years there had been a tendency to, perhaps, overemphasize subjective examination in refraction, or at least to emphasize certain subjective tests and methods for determining the result in refraction. At the same time, in a great many instances, the objective examination is neglected. He said that a paper of this kind would help to overcome some of the objections that have been advanced about objective examination and retinoscopy, particularly in those cases in which cycloplegics are employed. One of the chief objections to the use of cycloplegics has been said to be the very large pupil, and the difficulty in making a retinoscopic examination of the central area.

This, as Dr. Cowan pointed out, should not present any difficulty to one with any experience at all in retinoscopy. He said that he would add that retinoscopy should be performed in every case preliminary to subjective examination regardless of whether a cycloplegic has been employed or not. He said it is a mistake in the examination of the presbyopic especially, to omit retinoscopy.

Infection of the Human Eye with Torula Histolytica

Dr. Charles Weiss, Dr. M. C. Shevky, and Dr. I. H. Perry said that through the coöperation of Dr. Martin I. Cohen of San Francisco, they examined material obtained by trephining the sclera of a patient in whom the clinical diagnosis of a possible cyst of the retina had been made. The following history was given:

Mr. A., aged 56 years, had been in an automobile accident in 1941. In July,

1943, Dr. Nutting of Oakland, California, discovered a growth in his right eye, and enucleated the eye in October, 1943. Three months later the patient complained of poor vision in the left eye. He soon developed mental symptoms, and was confined in a sanitarium. The eye showed fine deposits on the posterior surface of the cornea, and on the anterior surface of the lens. There were "floaters" in the aqueous and vitreous. A diagnosis was made of "possible cyst of the retina with retinal detachment and uveitis." The sclera was trephined, and material obtained for culture showed the presence of a yeastlike organism which was identified as Torula histolytica (Cryptococcus hominis). This was the second case in the literature of an ocular infection due to Torula histolytica.

In its cultural characteristics the organism resembled Benham and Hopkins's Torula Group III when grown in cornmeal agar. Its ability to ferment carbohydrates was weak and variable. No gas was formed. Gelatin was not liquefied. There was abundant budding, but neither mycelia nor endospores were formed. The organism killed mice when injected intraperitoneally or intravenously.

When the culture was injected into the anterior chamber of the eyes of rabbits, it was possible to observe very early pathologic changes. The inferior part of the anterior chamber became opaque, and a pannus developed on the surface of the cornea.

Histologically there was a slight exudate consisting of polymorphonuclears and some monocytes along the periphery of the cornea. Along the anterior surface of the iris and the posterior surface of the cornea, there was a delicate festoon of rosettes. In the center of each rosette, there was a Torula organism surrounded by a single row of cells (polymorphonuclears and monocytes). Torula were seen engulfed within macrophages.

Discussion. Dr. William O. LaMotte, Jr., said that this organism known as Torula histolytica was brought to the attention of the Eye Department of the University Hospital during the past year through the opportunity of observing the eyegrounds of a patient on the Orthopedic Pediatric services who subsequently died of a Torula histolytic infection of such widespread degree that the term torulosis could aptly be applied to it. A report of this case will be published by Dr. Joseph Snyder, the resident pathologist at the University Hospital. This six-year-old girl was originally admitted for penicillin therapy of a chronic osteomyelitis in the left femur and right humerus. The offending organism was hemolytic Staphylococcus aureus. It was not long after admission that signs of a generalized systemic infection and involvement of the central nervous system appeared, including an increase in the cerebrospinal-fluid pressure. Many Torula organisms were isolated from the spinal fluid both by direct smear and culture. Despite massive doses of penicillin, intramuscularly and intrathecally, the child died. The penicillin therapy did not influence the number of organisms found in the spinal fluid. It was about six weeks after the first sign of the central nervous involvement that the child died. During all this time, she was kept under observation so far as the fundus was concerned. There were no definite changes until a week before death, at which time a bilateral papilledema of 2 to 3 diopters appeared. Also, in the region of the posterior pole of each eye, there were seen a number of poorly defined, pale yellow areas about one-eighth disc diameter in size, and deep to the retinal vessels, having somewhat the appearance of deep necrosis or deep exudates.

At the autopsy the orbits were unroofed, and the posterior segments of the

eyes were removed. In view of the fact that this Torula organism was found histologically in practically every tissue of the body, it was thought that perhaps the finding of Torula might explain these patches that were observed ophthalmoscopically in the eye before death. Sections did show in the retina a few nests of Torula histolytica, although not in so great abundance as was expected, judging from the lesions seen ophthalmoscopically.

This case, and the subject of Torula, brings up several interesting points. One is the fact that some authorities, and it is believed that Dr. W. Freeman and Dr. Fred Weidman are probably the principal ones, believe that the term histolytica is a misnomer, and in their experiments have shown that the organism is not actually histolytic for nervous tissue. Some of the brain sections from this case showed typical cystic areas containing Torula surrounded by brain tissue which had a compressed appearance. This in a sense might uphold the thought that the typical appearance is due to a disruptive rather than to a destructive process from the actual growth of the organism.

The portal of entry has always been a problem, and it has not been solved in this nor any other case. In this particular case, one would naturally expect that it might be the draining sinuses in the infected bones. However, at no time was anything but hemolytic Staphylococcus aureus obtained by culture from these lesions, although Torula were found in abundance histologically in the bone marrow as elsewhere.

Another point is that in all the articles that have appeared, and also in the recent one by Dr. Martin Cohen (Archives of Ophthalmology, December, 1944), the statement is made that this organism, genus Torula, occurs widespread in nature. He said he understood from Dr. Weidman, however, that an organism which can produce infection in the human or in an animal has not been found in nature; that these organisms of this group found widespread are all saprophytic, and that he considered it still a problem as to where this particular organism that causes human infection resides in between these relatively infrequently reported cases. He asked if, in his experiments, Dr. Weiss had used only the organism isolated from his case, or if he had actually attempted to produce animal infection with some of these organisms which had been found from this widespread source in nature.

Dr. Charles Weiss, in reply, said that only the strain which was isolated from the patient was used to produce the lesions in the rabbit's eye.

George F. J. Kelly,
Clerk.

AMERICAN JOURNAL OF OPHTHALMOLOGY

Published Monthly by the Ophthalmic Publishing Company

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PROBLEMS OF POSTWAR OPHTHALMALOGIC TRAINING

It is unfortunate that so many good ophthalmologists were not used to better advantage in the Armed Forces. To some extent this was unavoidable, since the age group of the service personnel largely excluded glaucoma, senile cataract, and the degenerative diseases. This fact, together with the mass of paper work, the annoying details of maintaining military discipline, or the enforced periods of complete inactivity, has made the average ophthalmologist feel that his time in the Army or Navy was more or less wasted, as far as scientific medicine was concerned. There are exceptions, of course, but a large proportion of them now returning to civilian life feel this way. These men have a sense of insecurity about reëntering the competition of private practice, and more and more of them are demanding refresher courses. It seems only right that their desires should be gratified.

In addition to this, many young medical officers who were denied the opportunity of taking a residency in ophthalmology, now wish to begin one. Based on replies received to questionnaires, the council on Postwar Medical Service of the A.M.A. has recommended that every approved ophthalmologic residency in the country increase the number of its house officers by 90 percent to accommodate this demand!

We are therefore faced with a problem of "reconversion" in ophthalmic education quite as serious as that which confronts industry.

In the editorial columns of the September, 1945, issue of this Journal, Post pointed out the need for every medical school and hospital to stretch its facilities to the utmost to provide places for these homecoming physicians. To take care of all of them would put too much strain on the already depleted facilities of these institutions and so impair the quality of the teaching that the expected benefits would not be realized. Every teaching center must, therefore, do the best it can in view of its resources and capabilities, keeping in mind that it is better to give good teaching to a few than poor teaching to many.

To help meet the demand for short periods of refresher work the Department of Ophthalmology of Harvard Medical School is planning to give two postgraduate courses early in 1946. The first course will last two months and will be devoted entirely to the fundamental sciences in ophthalmology. The subjects covered will be anatomy, histology, and embryology of the eye, bacteriology, physiology, pharmacology, and toxicology of the eye, neurology of the visual and ocular-motor pathways, and physiologic optics. Laboratory and experimental work will be included to illustrate the didactic exercises. This course is designed primarily for young doctors who wish to enter ophthalmology as a preliminary to beginning their residency. It is hoped that it will also prove beneficial to older ophthalmologists who feel the need for review and reörientation.

This course will be followed immediately by a one-month course in clinical ophthalmology. In this, all aspects of the clinical and pathologic work at the Massachusetts Eye and Ear Infirmary will be dealt with, and the recent advances emphasized. This latter course is open only to ophthalmologists who have had a recognized ophthalmic residency and to other physicians who have completed the first course in the fundamental sciences, or its equivalent elsewhere.

A maximum of 30 veterans can be accommodated in each course. The major part of the tuition will be borne by the government under the G.I. Bill of Rights.

The above is illustrative of a short period of training. Other medical schools are planning to give longer courses of six to nine months for those veterans who desire them.

In regard to the feasibility of increasing the number of residencies, certain difficulties arise. Although the financial responsibility of the government is clear in regard to organized postgraduate courses conducted by a paid faculty in an established medical school, there has been no definition of policy concerning residencies for which no tuition fee is charged. The cost of maintaining a house officer (room, board, and laundry) amounts to about $500 a year in the larger institutions. The addition of five or six extra residents for a two-year period would represent an added expense that many institutions might not care to assume. So far, this writer has not been able to obtain assurances from the Veterans Bureau that this maintenance charge will be paid by the government.

In fact, present instructions from Washington definitely state that payment for board, lodging, or other living expenses is prohibited. However, the Veterans Administration will pay to the veteran himself the usual $50 a month ($75 in case of a married man) for subsistence during his residency. There is some reason to believe that these amounts will be increased in the near future. Extra residencies must be created even though the housing problem in some hospitals may necessitate the veteran's living outside and paying for his own room. Such arrangements may seem niggardly in view of the sacrifices most of these men have made, but the housing situation may prove to be a formidable one if any substantial increase of residents is attempted.

Each institution will have to work out its own problem. It is hoped that each will do its utmost to help train these returning medical officers. The type of opthalmologic care the American public is going to receive during the next 10 years depends, to a large extent, upon our willingness to participate in this training program.

Edwin B. Dunphy.

THE LOS ANGELES MID-WINTER POSTGRADUATE COURSE

The fifteenth annual mid-winter postgraduate course of the Los Angeles Research Study Club was held from January 21st to February 1st, inclusive. It has been the endeavor of those in charge to make the course essentially practical; to have "ideas presented that may be taken home to be utilized in everyday practice" and to stimulate the interest in "research study." This year the first week was devoted to the eye. Over 300 registered for the ophthalmologic portion of the course; in this registration 27 states and British Columbia were represented.

Dr. Alan C. Woods of the Wilmer Institute discussed the various phases of ocular tuberculosis; management, diagnosis, and treatment of uveitis; sarcoid; Brucellosis; the ocular complications of congenital and acquired syphilis; sympathetic ophthalmia, and the role of focal infection. Dr. Jack S. Guyton, also of the Wilmer Institute, discussed the various operative procedures used in ophthalmology together with a new operation for orbital decompression. Dr. Meyer Wiener presented the Naval ophthalmic problem and gave an instruction course on major surgical procedures. Diagnosis and differential diagnostic problems of glaucoma, congenital cataracts, and ocular therapeutics were discussed by Dr. Frederick C. Cordes of San Francisco. Irving B. Lueck of Rochester, New York, presented various aspects of physiologic optics together with a discussion of color aptitudes and the new antireflection coating of ophthalmic lenses. In addition there was a discussion of the everyday spectacle problems. From the titles mentioned it is apparent that the program was varied and essentially practical.

It is noteworthy that in spite of the hardships, difficulties, and limitations placed upon it the course was able to continue its annual meetings during the war and to contribute to the war effort by making it possible for the busy and often overworked civilian ophthalmologist to keep abreast of the newer developments during that trying time.

While many of those registered attended the course last year, it was apparent that this year a high percentage were newly discharged veterans or men still in the service. For many it was the first real contact with civilian ophthalmology for a number of years; they had, in some instances, been stationed in areas or on posts where there was little or no ophthalmology, while others were in execu-

tive positions where there was no contact with clinical medicine. The attentive attendance at the lectures from 9:00 in the morning until 5:30 in the afternoon and the interest in the informal discussions over a cocktail or a glass of beer at the end of the day further showed the desire of this group to utilize every opportunity of refreshing their knowledge of the specialty. The experience in Los Angeles tends to emphasize the responsibility of American ophthalmology to make available to the returning veteran the opportunity of renewing his acquaintance with clinical ophthalmology.

The officers of the Research Study Club who were responsible for the arrangements for the course and who "warmly welcomed as guests of the Club" those in the military service are to be commended for making available to many returning service men the very interesting and practical one-week course in ophthalmology.

Frederick C. Cordes.

THE CHALLENGE

It is possible that historical research would show that after every major war the victors have won, in addition to other things, the leadership in science, including medecine. To support this premise by a thorough study would be interesting but somewhat beside the point, for, whether we like it or not, the responsibility for leadership in the medical education of the world is one that is now placed on the shoulders of the United Nations, particularly North America, England, and possibly Russia. Europe is too devastated and debauched to stage a comeback for a good many years. Her influence as a center for medical and, what particularly concerns us, ophthalmic education began to wane following the last war. This is shown by a declining trend in the number of our postgraduate students, during the last two decades, who went abroad for the study of ophthalmology. In addition to the declining number, the quality of the students was obviously poorer than before World War I.

The interwar period in the United States was one of exciting progress in the evolution of medical education and postgraduate training. The results reflected by this magnificent training were revealed in the fine work done by our young medical officers and in the extraordinary statistics of the treatment of battle casualties in this war. Modern therapeutics played their part, but the credit truly belongs to the work of the civilian doctor in uniform for his superb professional care of the sick and wounded.

The influence that our Army and Navy hospitals, especially the "affiliated" units, have had by their impact on foreign physicians and surgeons everywhere in the world will begin to become manifest in the near future. The result will be an ever increasing number of observers, students, and medical missions from everywhere coming to our country and to our schools and hospitals to learn from us.

The mental and physical distress, during the war years and immediately thereafter, endured by Great Britain and suffered by the occupied countries has had and will continue for some time to have an unfavorable effect upon the development or expansion of their physical plants and facilities for medical education, as well as on the teachers themselves in those countries. The dogged leaders of British ophthalmology, however, were making splendid plans for the future of ophthalmic education and training even while flying bombs were exploding and air-raid sirens were wailing. These plans have made good headway, and it may not be long before various postgraduate

courses, long and short, are offered to the world. The situation in the defeated countries must be one of great pessimism. One does not know and at this stage scarcely cares to find out what happened to the leaders in ophthalmology in those countries. What little we have learned of the medical practice under Hitler, and the results as seen in the German military hospitals and in their terrible concentration camps, leads us to fear no rivalry from that detested source for a long time to come. Through no fault of ours, we know actually very little about Russian medicine and surgery. There is no doubt about the upsurge and vitality of medical science in Russia at the moment. The need for medical treatment brought on by and during the war has given an enormous impetus to the movement of earnest scientific education in that country. The position that the medical citizen under Stalin occupies is one of the highest prestige, and Russian ophthalmologists are in a particularly favorable light. The number and value of their scientific contributions are steadily increasing and becoming robust. It is exhilarating to watch their development. But their time will be too occupied and their facilities too limited to care additionally for the training of foreign postgraduate students in medicine, even if the latter were to be given free access into the country.

Thinking along these lines leads us to wonder whether we in the United States are prepared for and agreeable to the position of leadership in ophthalmic education. At the moment our facilities, too, are not enough to care for all of our own ex-medical officers who are looking for training in ophthalmology. There are too few ophthalmic residencies for one thing, and, for another, pathetically few medical schools are developing courses in basic ophthalmology. The pressure of the demand for such courses is becoming nearly too great to bear, and more schools will be forced into giving them.

It is admittedly difficult for most medical schools to initiate and carry out basic and other courses in ophthalmology. This is partly because the ophthalmic staffs of many of the schools are essentially made up of voluntary clinicians who can spare but little time from their practices for the care of clinic patients, let alone teaching. It is also due to the rather low estate in which ophthalmologists are held by their fellows in general medicine and surgery, particularly on the faculties. This low opinon is a fact that was emphasized by Army experience. The attitude may be the result in part of the aloofness or clannishness or even inertia of the ophthalmologists themselves, but is probably the consequence of poor courses and propaganda in ophthalmology given to our general medical colleagues when they were medical students. Frankly, most of us have been too busy to teach our subject properly and with enthusiasm to the undergraduates. It may be necessary to "sell" ophthalmology to some of our medical schools in order to get necessary help in creating basic and even clinic courses. The Army or Navy ophthalmologist has done an excellent job of "selling" his specialty to his chief. Many of the latter have learned to hold in highest esteem the work of his ophthalmic medical officer and his place in the surgical specialties. At any rate, most of the chiefs of the surgical services in our Army hospitals have learned the difference between an optometrist and an ophthalmologist, which difference few of them knew or cared to know before the recent experience.

There is always the problem of sufficient financial backing for these undertakings. The fees for the courses probably will not cover the expenses. Equipment is difficult to find now and physical

things, such as suitable laboratory space and material and a lecture room, may be sadly lacking. More full-time or part-time teachers of ophthalmology must be provided for. Enough money must be raised for the eye departments of all our schools to develop and carry on the work of undergraduate and postgraduate teaching. There are 59 Class A medical schools in our country today and not more than six at the moment are giving or planning to give basic courses in ophthalmology.

We will have the backing of our ophthalmic associations and presumably that of the national medical societies as well in this venture. We will have the grateful support of the American Board of Ophthalmology, which is struggling with the problem of raising standards at a time of inadequate equipment for training and in the face of an overwhelming demand for such training.

Have we the energy, vitality, and initiative to accept the challenge and to seize the opportunity?

Derrick Vail.

BOOK NOTICES

THE FUNDAMENTAL COLOUR SENSATIONS IN MAN'S COLOUR SENSE. By Gustaf F. Göthlin. Seventy pages, 21 illustrations. Stockholm, Almqvist-Wiksells, 1943.

This summary in English of Göthlin's experimental results and theoretical views as to color vision marks a return of the author to this field of activity after a 20-year preoccupation with other subjects. The theoretical views are based upon the particular three-components formulation generated by choosing as fundamental colors red, green, and blue. Red plus green cancels to yellow, and yellow plus blue cancels to white. In these respects, Göthlin's views agree strikingly with those put forward by Ladd-Franklin in 1892, which, surprisingly enough, are not mentioned by him. The mechanism by which red-green and yellow-blue cancellations are accomplished, however, is taken to be an inhibitory action in the central nervous system. These views are adequate to account for Göthlin's experimental results on energy thresholds for the red sensation, on the situation and extent of the purely yellow zone in the spectrum of anomalous trichromats, and on energy thresholds for the blue and violet sensations; and like the Ladd-Franklin theory they account for a large proportion of the known facts of vision. They have not, however, been developed very far beyond the qualitative stage and in some respects seem rather confused.

For example, Göthlin rejects the urge of previous advocates of the three-components theory to choose imaginary colors for primaries, thereby eliminating negative portions of the three spectral curves of trichromatic coefficients. He says (p. 60), ". . . these (negative portions) really mean that an impulse for a colour sensation of whatever quality releases to some extent an inhibition of impulses for the complementary colour sensation within the same area." Such a view implies that the spectrum primaries, to which the coefficient curves refer, can correspond to the fundamental colors, themselves; but it is also stated (p. 68) that "no isolated fundamental colour sensation can be experienced subjectively—with the *possible* exception that the most long-wave red in a completely pure spectrum may give such a sensation of red. . . ." The difficulty is treated most elegantly by G. E. Müller (Z. Psychol., 1930, v. 17).

In spite of difficulties not resolved, and in spite of space wasted in summarizing inconclusive support for views already better supported by other work, there is

much in this summary to interest a student of visual theory. For example, the variations among different subjects with normal color vision in the position of the spectral zone for pure yellow are plausibly accounted for by supposing the existence of an individually varying proportion of the number of receptors for red aand for green combined with a mass action giving more weight to the central impression of a fundamental color component when the number of its excited receptors is greater. Furthermore the perception by a congenitally yellow-blue-blind observer (the famous case of Alrutz) of the short-wave end of the spectrum as "red with black spots" may be explained in the same way. Even the highly elaborated theory of Müller does not seem to do quite as well on these points.

D. B. Judd.

GENERAL AND PLASTIC SURGERY. By J. Eastman Sheehan, M.D. 1st Edition, clothbound, 345 pages, 495 illustrations. New York and London, Paul B. Hoeber, Inc., 1945. Price $6.75.

This book, which is the fifth in the career of the author, is not primarily a text for ophthalmologists but rather a treatise on general surgical techniques with an emphasis on war injuries.

The first four chapters deal with the agents which produce war wounds, the nature of such wounds, wound excision, and the control of wound infection. The author points out that prior to World War II, reliance was placed chiefly on bactericidal action, but after the power of the sulfonamides to induce bacteriostasis was demonstrated, attention has centered on this later method. Some space is devoted to the use of sulfonamides and penicillin. Chapter five deals with the subject of burns and their treatment. It is encouraging to note that he recommends that the tannic-acid treatment be abandoned and the wound be treated as an open wound with special attention to the elimination of infection and replacement of lost skin as early as possible. The major portion of the text is devoted to the care of wounds, and an attempt has been made to cover the whole field of surgery. The section on wounds of the face includes wounds of the orbit, and the discussion on reparative procedures about the eyes is brief and incomplete. The chapter on tissue replacement demonstrates the different types of skin flaps and classifies skin grafts on the basis of their thickness. Some attention is devoted to the Padgett dermatome, and there is a discussion of plasma and white-cell fixation of grafts and the use of other materials for plastic repair. The last two chapters are devoted to the healing of wounds and elaboration on the details of surgery for repair of the nose, the mouth, facial contours, the eye, and the ear.

The illustrations, which are numerous, consist chiefly of line drawings, and there is a tendency to oversimplification.

The book is interesting and contains much informative material but it is not comprehensive enough to be classified as a complete reference book on modern operative methods. No one can be experienced and well informed in the whole field of surgery, and, in our present day of specialization, the need is for books which cover a small field thoroughly rather than those which cover the whole field inadequately.

Irving Puntenney.

CORRESPONDENCE

Presbyopia associated with alternating squint

Editor,

American Journal of Ophthalmology:

I have been unable to find in the literature or texts any mention of the advantage to which alternating squint may be put in connection with prescribing lenses for the presbyopic. Nevertheless, a presbyopic patient with alternating squint can be made comfortable for both distance and near vision without the use of bifocals. I presume that others may have used the same means as I to accomplish this, for the method is simple and the results are greatly superior to those obtained with conventional glasses. However, if my method has been used before, no ophthalmologist appears to have taken the trouble to publish it, nor has it been mentioned in any textbook on refraction.

The method is simply to supply a distance lens for one eye and a near lens for the other. With a little patience and demonstration with the trial frame the patient readily learns how to use such glasses. If he is sufficiently presbyopic to need a +2.50 D.sph. addition, he can be given a distance lens for one eye and a bifocal for the other. The upper part of the bifocal would contain an addition of +1.25 D.sph. and the lower part an addition of +2.50 D.sph., the segments set high—up to the lower edge of the pupil. Thus he obtains the equivalent of a trifocal without being subjected to the inconveniences his neighbors have with their bifocals!

Care must be taken to differentiate between occasional squint and true alternating squint; for if a patient with the former type of strabismus is supplied with these glasses, he will probably complain of diplopia or blurring. However, I have one patient who has an occasional squint with an exophoria of 30D. and who so disliked his bifocals that, in desperation, I suggested he try the method I have just outlined. He managed successfully to suppress vision in the non-used eye and went happily about his work with an alternating extropia which gradually grew to 50D.

Should the strabismic patient see well with both eyes but nevertheless use one eye almost exclusively, it might be advantageous to prescribe a bifocal for the dominant eye and a distance lens for the less-used eye. The patient can then use the dominant eye for both near and distance, but can switch to the other eye when going downstairs, walking over rough ground, and at other times when he requires good vision for distant objects below the level of his bifocal segment.

If one does, routinely, the simple muscle tests that are necessary to obtain a good eye examination, one will discover quite a number of presbyopic patients with alternating squint.

I do not know of any more grateful patients than these. All their lives they have considered their eyes inferior to the eyes of their neighbors. Now, finally, they can be told that the opposite is true—they belong to a very exclusive group of people who will never need to wear bifocals!

(Signed)
L. J. Alger, M.D.
Grand Forks, N.D.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Baltin, M. M. **Falta's test in diagnosis of monocular blindness or marked reduction of vision or their simulation.** Viestnik Oft., 1944, v. 23, pt. 4, p. 22.

The best method for detecting simulation of monocular blindness should involve no special apparatus, should be quick, and should be capable of convincing lay persons. Falta's test consists in the patient fixing the examiner's finger at six inches from the nose and 1 cm. from the midline in the direction of the affected eye. Normally this is within the range of the near point of convergence. The finger is then brought closer and closer to the nose. A blind eye or an eye with marked reduction of visual acuity begins to turn out as the finger comes closer. In the presence of hyperopia or presbyopia +2 or 3D. lens is used in performing the test. M. Davidson.

Buerki, E. and Schmid, A. E. **Histochemical investigations of the demonstration and localization of vitamin C in the eye.** Ophthalmologica, 1943, v. 105, Feb., March, April, pp. 65-82 and 121-143.

The authors investigated various eye tissues for the presence of ascorbinic acid. Tissues of the eyes of normal and of scorbutic guinea pigs were placed in an acid silver-nitrate solution. Tissues containing vitamin C reduce this solution and show black granulated deposits within their cells. The eyes of normal guinea pigs showed reduction granules in the cells of the parenchyma and the epithelium of the cornea, the stroma of the sclera, the pigment epithelium of the iris, the stroma of the ciliary body, the choriocapillary layer of the choroid, the multipolar ganglion-cell layer of the retina and within the lens fibers. The optic nerve is practically free from ascorbic acid. Eye tissues from guinea pigs suffering from scorbutus had no reduction granules. The significance of this histochemical investigation for the question of the metabolism and cell mechanism of the

tissues of the eye is stressed and discussed. (Bibliography).

Max Hirschfelder.

Hruby, K. **Slitlamp microscopy of the fundus without contact glass.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 195-200.

To make the fundus visible in slitlamp microscopy the angle between the axis of the lamp and of the microscope must be made very small, and an image of the fundus must be brought within the focal distance of the objective of the microscope. This has been done by means of a heavy, awkward, contact glass which cannot be used with children or nervous and sensitive adults. The reduction of the angle has been accomplished by Koeppe with a silver mirror and by Lindner with an angulated microscope. The Swiss firm Haag-Streit has replaced Koeppe's mirror with a prism which is very satisfactory. The author avoids the need for a contact glass by placing a 55D. concave spherical lens before the patient's eye in a spectacle frame. He recommends this as an adequate method, particularly to those who have a Haag-Streit slitlamp. Users of a Zeiss slitlamp will need a Lindner angulated monobjective miscroscope. (References.)

F. Herbert Haessler.

Koch, F. L. P. **Ophthalmodynamometry.** Arch. of Ophth., 1945, v. 34, Sept., pp. 234-247.

Adequately to abstract this very complete review of considerable literature on ophthalmodynamometry is difficult. The author's own conclusions are as follows:

"It is unfortunate that the few studies which have been carried out in some detail with reference to the various pressure relationships involved have not followed a relatively standard procedure with regard both to the ophthalmodynamometric methods and apparatus employed and to the classification of normal and of abnormal states according to uniform criteria of diagnosis. The reports in the available literature, however, with respect to investigations on the various vascular pressure relationships confront the worker in this field with an inescapable sense of the futility of efforts to arrive at any reasonably definite values for the normal retinal blood pressures. It becomes practically impossible, therefore, to rely diagnostically on the figures given by the various investigators for the retinal blood pressures in the numerous forms or stages of local and systemic hypertensive disease of whatever cause. It would appear to be much more reasonable to depend primarily on the information gained from a careful ophthalmologic examination, with particular reference to all of the changes that manifest themselves in the retinal vessels, particularly the arterioles, and in the retina and choroid as well, and these findings necessarily must be correlated with the results of the general physical examination."

R. W. Danielson.

Lathrop, G. E. **Microtechnique of pathologic eye.** Amer. Jour. Clin. Path., 1944, v. 14, Nov., p. 131.

Tissue components of the eye are extremely variable. The succulent retina has to be fixed by a fluid which does not superimpose hardening on the toughness and friability of the cornea, the sclera, and the dural sheath of the optic nerve. For any purpose other than storage the pathologic eye should never be fixed in 10-percent formalin. Two for-

mulas are presented by the author for fixation. Dehydration must be accomplished with a minimum of shrinkage and distortion.

Theodore M. Shapira.

Niederhoff, P., and Kemp, R. **Examination of the field of vision with a flicker perimeter.** Klin. M. f. Augenh., 1941, v. 107, Sept., pp. 257-265.

The principle of this method has been described previously (Amer. Jour. Ophth., 1936, v. 19, Oct., p. 912). In the meantime the apparatus has been somewhat modified. The visual stimulus produced by intermittently appearing and disappearing white and colored (pigment) lights is argued to give more accurate results in perimetry than other methods, not only for determining the limits of the peripheral visual field but also for evaluation of pathologic scotomas and the blind spot. In glaucomatous eyes, disappearance of the flicker phenomenon is observed where light perception for constant lights is still present. (3 figures, 2 tables.)

F. Nelson.

Scharf, Josef. **Demonstration of an intraocular foreign body by means of gonioscopy.** Klin. M. f. Augenh., 1941, v. 107, Aug., pp 193-196. (See Section 16, Injuries.)

Shenkin, H. A., and Leopold, I. H. **Localizing value of temporal crescent defects in the visual fields.** Arch. Neurol. and Psych., 1945, v. 54, Aug., p. 97.

These cases are presented to emphasize that careful perimetric studies may reveal a crescentic defect in the temporal portion of the visual field which is of practical importance to the neurologist and the neurosurgeon. A monocular crescent defect indicates the general area involved by a tumor or other pathologic process.

In five cases presented here, uniocular temporal-crescent defects in the visual field were due to verified cerebral tumors involving the suprageniculate pathway. This finding is important as an early localizing sign.

Theodore M. Shapira.

Troncosco, M. U. **A new contact glass for gonioscopy.** Amer. Jour. Ophth., 1945, v. 28, Dec., pp. 1360-1361.

Verrey, F. **An arrangement for capillary centrifugation.** Ophthalmologica, 1943, v. 105, March-April, pp. 151-155.

An arrangement is described whereby the centrifuged sediment from a capillary tube of aqueous may be placed on the cover glass. Smallest amounts of aqueous humor could be examined by this method from a cytologic and microbiologic standpoint.

Max Hirschfelder.

Vogt, Alfred. **Selected chapters from volume 3 of the author's Atlas of slit-lamp microscopy.** Klin. M. f. Augenh., 1941, v. 107., Oct., pp. 435-442.

1. Vogt calls attention to the senile destruction of cells of the posterior pigmented epithelium of the iris and the deposition of their pigment in granules on the pupillary margin. Less well known is the pigment-cell destruction which occurs in the anterior mesodermic iris tissue during an attack of acute glaucoma and leaves a hitherto neglected picture, namely of areas of albinism or vitiligo of the iris. The pigment finds its way into the aqueous, and, being dense, is deposited in the dependent part of the chamber angle like blood cells in hyphema. Vogt suggests that this manifestation be called hypo-

melanosis. The peculiar lesion is often accompanied by changes in the lens cortex. These consist of branched opacities for the most part associated with the lenticular raphe. Unquestionably this cataract is produced in increased pressure which may be caused by glaucoma or a blow on the eye. In time the cataract sinks into the interior of the lens as new fibers grow over it.

2. Many observations, clinical and anatomic, lead the author to conclude that the hyaloid canal does indeed exist in the human vitreous and that its landmarks are gradually obliterated through a lifetime of stresses and strains produced in the vitreous by ocular movements. Hemorrhages sometimes delineate its anterior end, and are found 2 mm. nasal to the posterior pole of the lens. The postlental curvilinear white line which formerly was only of theoretic interest now has pathologic importance. Vogt also mentions that volume 3 of his Atlas contains many pictures which clarify posterior annular vitreous detachment.

F. Herbert Haessler.

2

THERAPEUTICS AND OPERATIONS

Aguirre, José. **An essay of the real and comparative value of prontosil and albucid in the treatment of blennorrheal purulent conjunctivitis.** Rev. Oto-Neuro-Oft., 1944, v. 19, Oct., pp. 132-134.

The series treated consisted of 12 cases, eight of which occurred in children between 15 days and three years of age. The other four were in adults between twenty and forty years of age. The methods utilized were local instillation, injection, and peroral administration. All cases of this blennorrheal conjunctivitis improved with treatment, and did equally well when using prontosil or albucid as a collyrium, or by injection. Albucid perorally yielded better clinical and bacteriologic results than prontosil.

Edward Saskin.

Amsler, M., and Verrey, F. **The practical use of puncture of the anterior chamber.** Ophthalmologica, 1943, v. 105, March-April, pp. 144-150.

Punctures of the anterior chamber for diagnostic reasons have been done in the Lausanne eye clinic on 1,065 eyes during the past two years. The puncture is made by a specially constructed needle. It is a harmless procedure and gives useful information as to the composition of the aqueous humor (albumin, cells) in different eye conditions. The reaction of the eye to the paracentesis with regard to exudation, tension, and resistance of the vessel is noted. Diagnostic puncture is of value in uveitis and other inflammatory conditions of the anterior part of the eye, in hypertension, in injuries, and before intraocular surgery.

Max Hirschfelder.

Arruga, H. **Experimental and clinical studies with penicillin in ophthalmology.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Sept.-Oct., p. 847.

Arruga demonstrated experimentally the antibacterial action of penicillin, by producing experimental corneal ulcers and intraocular infections and using one eye as a control. Before using penicillin clinically he demonstrated on patients and on himself that even a concentrated solution or ointment of sodium penicillin is well tolerated by the eye, provided that the penicillin is pure. He reports four cases of serpiginous ulcer, three of which recovered; in the

fourth the result was an opaque leucoma. The action of penicillin in these cases is not so spectacular as it is in general infections, but the drug is the best antiseptic at our disposal. Injections into the lacrimal sac were tried in six cases of dacryocystitis. The suppuration cleared up in 3 to 9 days. In three cases the remaining exudate was clear, resembling the white of an egg. The ointment and drops were tried in various types of keratitis, as well as in traumatic ulcers, marginal ulcers, and neurotrophic disturbances. In acute pneumococcus conjunctivitis the action of penicillin was rapid, and less painful but no more effective than that of one-percent silver nitrate. In chronic blepharitis penicillin was no more effective than the currently used remedies. This fact supports the accepted view that in chronic blepharitis the local infection is less important than general disturbances, such as hepatic insufficiency or allergy. Ray K. Daily.

Asnarez, Jose. **Rapid dacryocystorhinostomy.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1064.

The merit which the author claims for this technique is chiefly the rapidity with which the operation may be performed. He completes it in 15 to 20 minutes. The steps of the operation are: the usual incision with a knife; dissection with scissors; introduction of a mastoid speculum into the wound; isolation of the sac with scissors; incision of the sac as posteriorly as possible; introduction of three fine silk sutures into the anterior lip of the sac, which are laid aside; denuding of nasal wall of periosteum; perforation of the lamina papyracea; separation of nasal mucous membrane with a Citelli forceps; rapid enlargement of the osseous opening to the desired size; cutting a flap of nasal mucosa in the shape of a C, and joining it to the lacrimal sac by the three sutures; a skin suture and slightly compressive bandage complete the operation. The author doubts the importance of a smooth and regular bony aperture, and claims that there is less likelihood of injuring the nasal mucosa with forceps. In 200 cases, there were 4 percent faliures.

Ray K. Daily.

Atkinson, W. S. **Interstitial keratitis treated with subconjunctival injections of penicillin.** Arch. of Ophth., 1945, v. 34, Sept., p. 233. (See Section 5, Conjunctiva.)

Barrenechea, S., and Contardo, R. **Penicillin in ophthalmology.** Arch. Chilenos de Oft., 1945, v. 1, Jan.-Feb., pp. 12-17.

The authors have used penicillin locally or generally in 32 cases: 8 of chronic blepharitis, 16 of bacterial conjunctivitis, 3 of corneal ulcer, 2 of perforating corneal wound, 1 of panophthalmitis secondary to orbital cellulitis, and 1 of acute iritis. Excellent results were had in all these cases. (References.) W. H. Crisp.

Bashoff, P. H. **The results of corneal transplantation and plastic operations.** South African Med. Jour., 1945, v. 19, June 23, p. 209. (See Section 6, Cornea and sclera.)

Bonaccolto, G. **Extraction of dislocated lenses from vitreous.** Amer. Jour. Ophth., 1945, v. 28, Dec., pp. 1335-1339.

Bordas, F., and Burch, M. **The technique of dacryostomy.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1044.

This is a well-illustrated description

of the authors' technique of external dacryocystorhinostomy which they perform as an ambulatory operation. Burch designed eight burrs of various shapes and sizes, the purpose of which is rapidly to produce an adequate osseous opening into the nose without damaging the periosteal surface of the nasal mucosa. The incision into the lacrimal sac and the anastomosis with the nasal mucosa follows closely that of Dupuy-Dutemps. Fine silk is used for the sutures and a Beaupre epilation forceps serves most conveniently as needle holder for the fine needles. In order to keep the anterior flap from retracting backwards and blocking the new intranasal opening, the central suture of the anterior flap is brought out through the wound and tied to the skin suture. Two days after the operation the sac is irrigated through the lacrimal puncta. The nasal packing is discontinued on the fifth day and the cutaneous sutures are removed on the sixth or seventh day. Of 52 patients thus operated on, the results were satisfactory in 49. In one case the failure was due to a hypertrophied middle turbinate; in one to cicatricial bands within the sac, and in the third no reason for the failure could be discovered. (7 illustrations.)

Ray K. Daily.

Brausewetter-Koppner, G. **Comparison between trephining (Elliot) and iridencleisis (Holth).** Klin. M. f. Augenh., 1942, May-June, v. 108, p. 303.

In order to allow a proper comparison of the effect of two fistulating antiglaucomatous operative procedures, Elliot's trephining was performed on one eye of 75 patients with bilateral glaucoma and Holth's iridencleisis on the other. After trephining 11 eyes required a second operation, after iridencleisis 19 eyes. Four eyes were lost after trephining, one after iridencleisis had been performed, and 13 eyes were almost or completely blind before operation. Five trephined eyes became infected postoperatively, two of them immediately. All late-infected eyes were lost. In one case sympathetic ophthalmia resulted in total blindness of both eyes. Seven eyes developed cataract after Elliot's operation and four after Holth's. Free fistulation was observed after 11 trephinings and 6 iridencleises. Of fifty patients who were operated on only once in each eye trephining failed to reduce the tension in three and iridencleisis in four. Eleven trephinings and ten iridencleisis required at least a second operation. Thirty-five trephinings and 36 iridencleises were successful in preserving the function of the eyes, though some of these eyes were under observation for only one year. Trephining is the more dangerous operation because of the occurrence of infections. After iridencleisis no infections were observed. From the cosmetic standpoint trephining with peripheral iridectomy is preferable. The course of the glaucoma in both eyes of an individual patient did not differ regardless of which operation was used. (1 diagram, 1 chart, bibliography.) F. Nelson.

Carrasco, Guijarro. **Short wave in ocular infections.** Arch. de la Soc., Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1079.

Two cases are reported. The first concerns a five-year-old child with a metastatic purulent endophthalmitis, subsequent to an acute exanthema. There was an enormous exophthalmos, extensive hard chemosis, evidence of pus within the eyeball, severe pain,

fever, and prostration. Short-wave therapy rapidly relieved the pain, and after the third or fourth treatment the general condition of the child was much improved; the child recovered with an atrophic eyeball.

The second patient had an orbital abscess as a complication of a severe erysipelas, which was treated by drainage and multiple incisions. The recovery was definitely accelerated by short-wave therapy. Ray K. Daily.

Cetner, J. A. **Practical method for application of ophthalmic ointments.** U. S. Naval Med. Bull., 1945, v. 45, Oct., p. 767.

To facilitate insertion of ointments directly into the conjunctival sac when collapsible tubes are not available, the use of an ordinary 2-c.c. glass syringe is suggested. It is particularly recommended in epidemics when large numbers of patients must be treated.
Morris Kaplan.

Chulia, Vicente. **Repair of an extensive posterior symblepharon.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1070. (See Section 5, Conjunctiva.)

Costi, C. **X-ray therapy in inflammatory ocular diseases.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1072.

Costi urges X-ray therapy in inflammatory ocular conditions which fail to respond to the usual therapeutic procedures. The dose required for inflammatory lesions is very small and is in inverse ratio to the intensity of the inflammatory process. He reports a grave case of bilateral cellulitis, and a case of severe corneal abscess which responded well to X ray irradiation, after failing to improve on sulfa drugs and foreign-protein therapy. He uses irradiation in acute or subacute dacryocystitis to reduce the inflammatory process preparatory to surgery. This enables him to work with good anesthesia and hemostasis, which is difficult to obtain in the acute inflammatory stage. Ray K. Daily.

DeVoe, A. G. **Surgery of the anophthalmic orbit.** Amer. Jour. Ophth., 1945, v. 28, Dec., pp. 1346-1351.

Djacos, C. **Modern tattooing of the cornea.** Arch. d'Opht., 1945, v. 5, no. 1, p. 36.

The author gives a historic review of the subject of corneal tattooing and describes in detail both the method of Knapp in which gold chloride is employed and that of Rollet who injects a nonabsorbable coloring matter into the leucomatous cornea. The latter method is favored. The author injects a 2-percent solution of India ink into the corneal stroma in the proper location by means of a special metal syringe designed by Raison. In cases of extensive leucoma two or three punctures are made and great care is taken not to inject an amount which elevates the corneal epithelium. Five cases are cited in which satisfactory results were obtained. After two years there was no attenuation of the coloration or migration of the pigment.

The method of Knapp has the disadvantage that the solution of gold chloride is caustic and requires neutralization. From 1- to 4-percent solutions are employed according to the thickness and whiteness of the leucoma. Two cases are reported. In one the cosmetic result was good, but in the other the pigmentation was not uniform. Djacos notes that there is a marked

uveal reaction and that patients complain of much postoperative pain. Furthermore the coloration is not permanent and repetition of the tattooing is necessary after a period of several years. There is also a tendency towards vascularization of the impregnated area. Phillips Thygeson.

Fassbind-Knapp, Dora. **Condensed survey of the technique and results of chemical tattooing of the cornea.** Klin. M. f. Augenh., 1942, May-June, v. 108, p. 262.

The advantages of tattooing the cornea with gold chloride and other metallic salts, especially platinum chloride, are the simplicity of the process, the comparatively insignificant postoperative irritation, the possibility of treating thin and adherent scars without danger of perforation, the rarity of postoperative complications and the beautiful cosmetic result. A disadvantage is the frequent impermanence of the result, which, however does not exclude repetition of the process. A good cosmetic result may last for several years. The method is contraindicated when the corneal tissue is seriously impaired or where inflammatory processes are still active. The article contains a history of corneal tattooing, a discussion of methods, clinical observations, advice about the use of different metallic salts, a statistical survey, and some histologic findings. She also mentions the possibility of tattooing the palpebral conjunctiva of albinos to eliminate some of the glare and adds observations about the deposition of gold into the cornea in patients who have been treated with colloidal gold solutions (sanocrysin) intravenously. (2 microphotographs, bibliography)

F. Nelson.

Friede, Reinhard. **The treatment of ocular infections with sugar.** Klin. M. f. Augenh., 1941, v. 107, Oct., pp. 404-410.

In ophthalmology sugar is used therapeutically in two ways: 1. Intravenous injections of 20- to 50-percent dextrose solution to reduce tension by removing water. 2. Local application to cornea and conjunctiva where too the basis of action is a reduction of swelling by osmosis. The author has experience with 60 cases of ocular disease and finds diseases of the anterior and middle layers of the cornea susceptible to this form of therapy. It has been most promising with clearing of corneal transplants which have become clouded.

F. Herbert Haessler.

Gradle, H. S. **Prevention of wound rupture after cataract extraction.** Anales Argentinos de Oft., 1944, v. 5, Jan.-Feb.-March, pp. 13-16.

Postoperative corneoscleral ruptures may be classified as simple fissure of the incision, frank rupture with destruction of new-formed capillaries and hyphema, and extensive rupture with iris prolapse. In 200 consecutive cataract extractions, the author claims an incidence of 35 percent the first type, 15.5 percent of the second type, and 2.5 percent of the third most serious group. There was no correlation between these ruptures and the ability of the surgeon or the procedure employed.

Gradle feels that the genesis of wound rupture may be traced to pressure on the globe by the orbicularis muscle, in conjunction with the recti. To overcome this hazard, he performs an oblique tenotomy of the orbicularis muscle near the outer canthus in both lids, with a subsequent marked reduction in the incidence of all types of

cataract-wound rupture. (3 illustrations.) Edward Saskin.

Hartmann, Karl. **The treatment of anomalies of the position of the lids by means of electrocoagulation.** Klin. M. f. Augenh., 1942, v. 108, May-June, p. 342.

Scarring of the conjunctiva in ectropion with silver nitrate, sulfuric acid, or Paquelin cautery has been used for years in order to shorten the surface of the conjunctiva and to straighten the lid. The author used electrocoagulation with the diathermic needle for the treatment of entropion and eetropion. This method is recommended especially for cases of senile ectropion and eversion of the lacrimal punctia with epiphora. The result is said to be more complete and permanent because extensive scars develop in all the tissues of the lid. Several rows of point-like diathermy punctures are placed in the conjunctiva in ectropion and in the skin of the lid in entropion. (4 case reports, 2 drawings, literature excerpts.) F. Nelson.

Himmelmann, W. **Scopolamine-en-kodal-ephetonin injections in ophthalmology.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 214-217.

The author recommends this form of general narcosis for ophthalmic surgery, particularly in strabismus, retinal detachment, and plastic surgery. In 370 operations there were no circulatory mishaps. (References.)

F. Herbert Haessler.

Karbucher, P. **Combined corneal abrasion and iridectomy in cases of metaherpetic parenchymatous keratitis, corneal tuberculosis and other corneal inflammation combined with iridocyclitis.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 184-187.

The author reports nine brief case histories to illustrate very satisfactory results from the application of the surgical procedure described in the title. The procedure was devised by Vogt. F. Herbert Haessler.

Kötz, H. **A statistical study of hemorrhage after operations for senile cataracts.** Klin. M. f. Augenh., 1942, v. 108, May-June, p. 291.

The author presents a statistical analysis of the postoperative hemorrhages which occurred after extraction of 750 senile cataracts in the years 1938 to 1940. In the group of 440 otherwise uncomplicated senile cataracts hemorrhages occurred in 18.9 percent, most frequently on the 4th or 5th day. The percentage of hemorrhages after intracapsular extraction was almost twice as high as after extracapsular extraction. The greatest number of hemorrhages was found in December. In females the occurrence of hemorrhages increased with advancing age. Males were particularly predisposed in the fifth decade of life. Controlled diabetics were not more predisposed to bleeding, nor were hypertonics, provided they were preoperatively treated with ample bleeding. Glaucomatous patients were equally predisposed to hemorrhages as arteriosclerotics. Postoperative hemorrhages not only influence the duration of hospitalization (average 23 days as against 18 days in uncomplicated cases) but also the final result of the operation. Kötz recommends saturating doses of vitamin C in the preoperative and postoperative period for all cataract patients. (Bibliography.) F. Nelson.

Lehrfeld, L. **Revaluation of Her-**

bert's flap operation for glaucoma. Arch. of Ophth., 1945, v. 34, Sept., pp. 191-194. (See Section 8, Glaucoma and ocular tension.)

Leopold, I. H. **Local toxic effect of detergents on ocular structure.** Arch. of Ophth., 1945, v. 34, Aug., pp. 99-102.

A number of detergents are in use in ophthalmology as germicides and cleansing agents but more particularly to aid in the penetration of therapeutically active substances through the cornea. Experiments were conducted on the normal and on the abraided rabbit cornea to determine whether or not the detergents exerted a local toxic effect on the eye. The agents tested were Aerosol OT, Aerosol OS, Tergitols 4 and 7, Tergitol 08, Zephiran, and Duponal ME dry.

It was found that repeated application of detergent solutions produced conjunctival damage in concentrations as low as 0.1 percent. Zephiran chloride in this concentration produced corneal damage. Repeated applications of higher concentrations of all of the agents tested produced superficial corneal changes in normal rabbits. Regeneration of corneal epithelium was retarded by the repeated application of solutions containing 0.5 percent of each detergent and to a slight degree by solutions of 0.1 percent. The tissue damage resulting from one application of the undiluted agents is reparable. The damage observed is in the cornea and conjunctiva with no involvement of the deeper structures. These studies do not contraindicate the use of the detergents; they simply call attention to the toxic property of these compounds. John C. Long.

Lugossy, G. **Effect of diathermy on the eye.** Klin. M. f. Augenh., 1942, v. 108, May-June, p. 319.

Since the introduction in 1930 of diathermy as a method for closing tears of the retina, the use of diathermy has been considerably expanded. Weve, Imre, and Csapody reported successful destruction and cure of an intraocular malignant melanoma. After a complete blockade of the whole area surrounding the tumor the latter was burned out with electric-wire cautery. Since no exact data concerning the strength of the current nor the duration of its application in such operations have been published the author undertook to find out these requirements experimentally in rabbit's eyes. One series of eyes was enucleated immediately after the operation, another after one week, and a third after two months and examined histologically. In all eyes a thorough destruction of the retina was found in the treated area. Extensive hemorrhages were also always present. The diathermic coagulation not only acts locally but leads to considerable hyperemia and hemorrhages in more distant areas of the eye because it raises the intraocular temperature. The effect of a known strength of current varies with several factors, such as more or less perfect contact between the electrode and the sclera, dryness of the field of operation, and degree of local hyperemia. Histologically no thrombosis of the vessels was found, and hyperemia was still considerable on the seventh day after operation. The author was unable to produce a complete coagulation blockade of the area where a tumor was anticipated. The strong reaction of the choroid, excessive hyperemia, and the lack of thrombosis in all eyes, whether treated with a current of 40 to 50 or 60 to 70 milliamperes for

one to three seconds, showed that the necessary strength of the current and the optimal time of application have not yet been determined and that further research is required to avoid grave danger in treating malignant uveal tumors with diathermy. (6 microphotographs, bibliography.) F. Nelson.

Luzsa, Andreas. **The effect of silver-nitrate solution dropped in before an eye operation.** Klin. M. f. Augenh., 1941, v. 107, Sept., pp. 231-234.

To render harmless pathogenic germs present on the human conjunctiva, at least for a certain danger period, it is recommended to instill a 1-percent silver-nitrate solution on the bulbar conjunctiva of patients who are undergoing an operation which opens the globe. This should be done after giving the local anesthetic, and immediately before the operation is performed. Culture tests, as well as clinical experience with conjunctival irrigation fluid proved the value of this procedure. Possibly the thin and invisible coagulation membrane produced by silver-nitrate solution fixes, at least for the duration of the operation, any germs still present. (References.) F. Nelson.

Malbrán, Jorge. **Restoration of the socket or the lower cul-de-sac after enucleation.** Arch. de Oft. de Buenos Aires, 1943, v. 18, Aug., p. 394.

After a brief review of the different operations for the reconstruction of the socket or conjunctival cul-de-sac, the author describes Wheeler's operation and considers it the ideal procedure because of its simplicity and excellent results. (Bibliography.)

Plinio Montalván.

Malbrán, J., and García Nocito, P. F. **Burch's operation.** Arch. de Oft. de Buenos Aires, 1943, v. 18, Aug., pp. 399-404.

Based on their experience, the authors prefer Burch's operation to enucleation. This consists of evisceration with implantation of a gold or lead-free glass sphere in the scleral cavity. They used vitallium and lucite spheres, preferably the latter. The implant has never been expelled in any patient. (1 illustration.)

Plinio Montalván.

Moreu, Angel. **Goniotrabeculotomy and goniocyclodiathermy.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1011.

The author's procedure seeks to combine the advantages and eliminate the undesirable features of Barkan's goniotomy and Vogt's cyclodiathermy. He does not agree with Barkan on the important role which sclerosis of the walls of Schlemm's canal and obstruction of the pectinate ligament with detritus or pigment have in the pathogenesis of primary glaucoma. In ten years of gonioscopic study he never encountered the signs described by Barkan as indicative of sclerosis of the walls of Schlemm's canal. The usual finding is an edema of the ciliary body accompanied by a slight exudate which penetrates the meshes of the pectinate ligament and gives rise to peripheral synechia; new blood vessels form around Schlemm's canal, and exudates finally obliterate the angle of the anterior chamber. The typical glaucomatous lesions consist of an edema of the uvea and a resultant irido-cyclo-choroidal stasis. The author believes that goniotomy is indicated only in trabecular, infantile, absolute, and malignant glaucoma, and in hypertension secondary to uveitis. The presence of peripheral

synechiae is a contraindication to goniotomy; in such cases separation of the iris is followed by a hemorrhage, and an examination several days later reveals a re-formation of the synechiae, sometimes in increased numbers. Postoperative examination of patients treated by goniotomy revealed that the main defect of this procedure is the increased formation of trabecular synechiae which leave the angle of the anterior chamber in a worse state than it was before the operation. It occurred to the author to supplement goniotomy with diathermy. The advantage of this procedure over Vogt's cyclodiathermy consists in the more direct approach to the ciliary body, in reducing the numbers of punctures, and in not disturbing the pericorneal vascular network. With the goniocyclodiathermy the peripheral synechiae are divided without hemorrhage, and the edematous areas of the ciliary body are coagulated relieving the stasis and edema of this area; the coagulated areas, surrounded posteriorly by an inflammatory zone leave an atrophic cicatrix. In this operation there are two distinct procedures which may be used separately or combined: cutting with an electric current and diathermy puncture. The operation is performed under gonioscopic guidance through a Koeppe contact lens which has a perforation on the side large enough to permit the passage of a Ziegler knife-needle. The knife-needle is introduced through the cornea, passed through the anterior chamber, and fixed in the synechia; it is then connected to a diathermy terminal, and a current of 60-70 milliamperes is used to cut the synechia. For coagulation of edematous areas in the ciliary body a fine needle 1.5 mm. in diameter is introduced in the same manner, and 40-50 milliamperes of diathermy passed through the area; 6 to 8 such punctures are made. In the combined procedures it is preferable to begin by coagulation, cutting the synechiae afterwards. The author believes that this operation is indicated in all cases where a goniotomy or cyclodiathermy is considered. (2 illustrations, 6 graphs.)

Ray K. Daily.

Muldoon, W. E. **Restoration of patency of nasolacrimal duct.** Amer. Jour. Ophth., 1945, v. 28, Dec., pp. 1340-1345.

Mylius, Karl. **Dimming of the psyche in ocular surgery.** Klin. M. f. Augenh., 1941, v. 107, Sept., pp. 225-230.

After paying tribute to Koller, who first applied cocaine as a local anesthetic for eye operations, Mylius points out that it is sometimes desirable or necessary to supplement local anesthesia with an agent that is not a general anesthetic but which puts the patient completely to sleep. Morphine has a number of well-known disadvantages. Avertin, per rectum or intravenously, has not fulfilled expectations. Evipal sodium represented a definite improvement but sometimes produced undesirable incidental and secondary effects, such as muscle jerks, sneezing, coughing, and defense movements. A combined solution of scopolamine-eucodal-ephetonin (S.E.E.—Merck) which can be injected intravenously and should be administered after the patient has entered the operating room, is superior to all previous agents, since with it undesirable by-effects are not observed. It does not put the patient to sleep but dims his emotions and eliminates anxiety even in very nervous and excited persons. It

produces complete equanimity but not unconsciousness, so that the patient never loses control and is always able to coöperate intelligently with the surgeon. Even such prolonged operations as retinal detachment can be carried out safely with this method. Combined with local anesthesia the analgesic effect of S.E.E. is strong enough to allow otherwise painful operations, for example, acute glaucoma and strabismus operations, to be performed absolutely pain free. The postoperative value of S.E.E. includes absolute relaxation of the patient and a pain-free period of many hours after the operation. F. Nelson.

Ohm, J. **The objective detection of night blindness in retinitis pigmentosa with the help of the optokinetic nystagmus.** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 61.

Since Rieken, who first used optokinetic nystagmus for objective adaptometry, has not yet dealt with retinitis pigmentosa, Ohm is presenting his first observations with two such cases. The inadequate light sense and the disturbance of the dark adaptation in retinitis pigmentosa could be demonstrated and measured quantitatively with the help of optokinetic nystagmus in two patients. One was a male aged 19 years and the other of a female aged 38 years. (6 kymographic curves, 2 references.) F. Nelson.

Poleff, L. **The real value of treatment by sulfonamides in trachoma.** Ophthalmologica, 1943, v. 105, March-April, pp. 156-174. (See section 5, Conjunctiva.)

Rhode. **The mechanism of action of the sulfonamides and their significance in ophthalmology.** Klin. M. f. Augenh, 1942, v. 108, Jan.-Feb., p. 1.

Many theories have been advanced concerning the mode of action of the sulfonamides on bacteria in vitro and in vivo. None of them have been absolutely satisfactory nor explained fully the effect of the various sulfa drugs. Some authors believe that formation of peroxides in the organism is responsible for the destruction of germs in the body, others that sulfa drugs produce an increase of phagocytosis or a wall of leucocytes to stop the invasion of bacteria. It seems certain that bacteria are damaged by the drugs, particularly in vivo, and their growth stopped to a certain degree. Bacilli require certain substances in order to grow; e.g. p.-amino-benzoid acid, which is probably formed by the bacteria themselves. Since p.-amino-benzoic acid apparently is antagonistic to sulfonamides and can render them ineffectual this substance may be responsible for the ineffectiveness of sulfonamides in cultures.

In the field of ophthalmology sulfa drugs have been used with success locally, orally, and parenterally for combatting various bacterial and virus infections such as iridocyclitis with hypopyon, vitreous abscesses, dendritic and herpetic keratitis, corneal ulcers, infections of the lids, gonorrheal ophthalmia, and trauma. Prontosil, sulfanilamide, and sulfathiazole have been most used. (Bibliography.)

F. Nelson.

Rossi, Silvano. **Irradiation of the cervical sympathetic in arterial hypertension.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1023.

Reference is made to a former publication on the efficacy of irradiation of the cervical sympathetic in glaucoma.

(Casanova "La irradiacion del simpatico cervical en el glaucoma-Clinica"). In this presentation the author wishes to add another indication for this procedure, that is, the reduction of the intraocular pressure in cases in which surgery was inadequate. The experience with postoperative irradiation gives the impression that in addition to mechanical factors controlled by surgery, there exist in glaucoma complicated processes directly under control of the neurovegetative nervous system, which respond to irradiation of the cervical sympathetic, thus achieving a satisfactory result which is not obtained by surgery alone. He describes a patient who still had an average tension of 48 mm. Hg after an Elliott trepanation. After three irradiations the tension was reduced to 22 mm. Hg and remained at this level without the use of miotics. Casanova also reports observations on three patients in whom the tension remained normal for almost two years after it had been reduced by irradiation. On the basis of this experience the author urges that irradiation of the cervical sympathetic be tried before subjecting the patient to a second operation. Assuming that a neurovegetative neurosis is an important factor in the development of glaucoma, irradiation is probably effective by presenting a barrier to the transmission of impulses, and freeing the eye from the excessive influence of the sympathetic nervous system. The clinical effect of the irradiation on the eyes is more lasting than the inhibition of the sympathetic itself. This suggests that a readjustment has probably taken place in the ocular tissues and blood vessels. Experimental irradiation on animals indicates that irradiation acts on the synapse within the ganglion, altering its capacity to conduct stimuli, possibly by a change in cellular permeability. Retinitis pigmentosa and organic and functional obstruction of the retinal vessels are suggested as fields of investigation for this form of therapy. Ray K. Daily.

Schultz, A., and Jaeckle, C. E. **Plastic surgical repair about the eyes with free grafts.** Arch. of Ophth., 1945, v. 34, Aug., pp. 103-106.

The surgical correction of scarred deformities about the eyes has assumed increasing importance as the result of war injuries. It is preferable to have plastic surgical procedures about the eye performed by the properly trained ophthalmic surgeon because of his special knowledge of the physiology and anatomy of the eye and its adnexa. The authors review the technique and indications for the use of mucous-membrane grafts, free epithelial grafts, and free full-thickness grafts. The use of the mucous-mebrane graft is illustrated in the correction of a symblepharon produced by a lime burn.

As an illustration of the use of free epithelial grafts the authors report a case of plastic repair of the orbit by epithelial inlay. A full-thickness free graft was used to correct a cicatricial defect of the upper lid.

John C. Long.

Sorsby, Arnold. **Local penicillin for ophthalmia neonatorum.** Brit. Med. Jour., 1945, June 30, p. 903. (See Section 5, Conjunctiva.)

Stocker, F. W. **Response of chronic simple glaucoma to treatment with cyclodiathermy puncture.** Arch. of Ophth., 1945, v. 34, Sept., pp. 181-186.

(See Section 8, Glaucoma and ocular tension.)

Thiel, R. **The mydriatic effect of various sympathic stimulants (aryl-alkylamines).** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 10.

A. Experimental section: The effect of twenty different substances of the aryl-alkylamine group on human eyes were exactly recorded under uniform conditions. The intensity of light was uniform and relatively high in order to approximate the condition of clinical examinations. The size of the pupils was measured with Landmann's pupillometer, accommodation was tested with Adam's accommodometer, the intraocular pressure with Schiøtz's tonometer (model 2). Instillation was done while the patient was in a horizontal position. Standardized pipettes were used in order to safeguard uniformity in size of drops. Usually 15 persons were subjected to the test with each substance. With substances which produced irritation of the eye and apparently had little or no effect on the pupils a smaller number of tests was made. The age of the persons used varied since it is known that pupils of young people dilate more readily and extensively than those of older ones. (The following chapter has to be read in the original since it would not be understandable without the help of the given chemical structural formulas and curves.) The experiments gave evidence that the strongest mydriatic effect can be obtained with primary amines as 1-phenyl-2-amino-propan. The secondary related amines have a much lesser effect and the tertiary bases are not effective at all.

B. Clinical section: For diagnostic purposes it is desirable to have a drug which dilates the pupil quickly and extensively, and produces a mydriasis of short duration. It is also desirable that the pupillary reaction to light be abolished, that accommodation and intraocular pressure (glaucoma and preglaucoma) are not affected, that mydriasis can be reversed by application of miotics at any time, and that the drug is tolerated well. Therapeutically the amines are useful in many cases where cycloplegics like atropine, scopolamine, and homatropine, do not produce the desired dilation (iritis, iridocylitis) and where an additional mydriatic effect is desired. The amines can be used in combination with cycloplegics in the form of drops or ointments. The effect of the amines is due to irritation of the sympathetic fibers of the dilator of the iris. (18 graphs, 2 charts, 4 photographs, report of 10 cases.) F. Nelson.

Von Sallmann, L. **Penetration of penicillin into the eye.** Arch. of Ophth., 1945, v. 34, Sept., pp. 195-201.

This paper reports additional work by the author on the penetration of penicillin into the eye when used locally. Three local methods, designed to introduce comparatively high concentrations of drugs into the anterior segment of the eye, were tested on rabbits and the results compared. The methods were subconjunctival injection, iontophoresis, and the application of cotton packs saturated with a solution of penicillin.

After the subconjunctival injections the author noted that the conspicuous bulging of the conjunctiva visible for four to six hours was apparently due to the accumulation of tissue fluid, since the concentration of penicillin in the aqueous and tissue extracts decreased

steadily after the first hour. There was no indication that any of the examined fluids and tissues retained penicillin for more than six hours.

The solution of penicillin injected contained 5,000 Oxford units per c.c. It is questionable whether solutions of this strength can be employed subconjunctivally in the human eye without producing a severe reaction. In two patients a solution containing 2,000 Oxford units per c.c. caused obvious discomfort.

A comparison of the three methods showed that the highest concentration was obtained in the aqueous by iontophoresis, and in the cornea, the iris and ciliary body by the prolonged application of cotton packs. The lowest concentration of penicillin in the aqueous, the cornea, and the iris with ciliary body was observed after subconjunctival injection.

Extremely high concentrations of penicillin were found in the cornea, the iris, and ciliary body after the application of cotton packs saturated with a solution of sodium penicillin containing 20,000 Oxford units of penicillin per c.c. The penicillin content of the aqueous was also higher than that obtained with the other methods tested.

The depletion of penicillin from the ocular tissues and the aqueous was almost complete eight hours after iontophoresis with a solution of sodium penicillin containing 5,000 Oxford units of penicillin per c.c. and after application of cotton packs saturated with a solution containing 20,000 Oxford units per c.c.

In general, not more than traces of penicillin were demonstrated in either the lens or the vitreous after topical administration.

Determinations on four human eyes with normal and with edematous corneas gave more erratic results and much lower values than determinations on rabbits' eyes. R. W. Danielson.

Wright, R. E., and Stuart-Harris, C. H. **Penetration of penicillin into the eye.** Brit. Jour. Ophth., 1945, v. 29, Aug., pp. 428-436.

Twelve cases are reviewed in which various methods of penicillin administration were used. In five of these cases the fluids showed detectable inhibitory action. Penicillin reaches the aqueous humor when given by local irrigation or by intramuscular injection, but the concentrations obtained are variable and often low. By the use of iontophoresis, higher intraocular concentration can be obtained. The fluid from the three eyes treated by ionization showed definite bacteriostasis. In only one of the eyes treated by irrigation was a comparable inhibition obtained.

At present it is impossible to define the concentration of penicillin necessary for therapeutic effect in either blood or tissue fluid. It may be that the small amounts of penicillin reaching the aqueous humor after intramuscular injections or irrigations will prove to be clinically adequate, but the fact that high intraocular concentrations can be obtained by iontophoresis is worthy of further investigation. (2 tables, references.) Edna M. Reynolds.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Birch-Hirschfeld. **Disturbances of the light sense in aviators.** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 56.

As already pointed out by Italian authors, especially Colojani, ocular and

extraocular factors play a part in the deterioration of the light sense of flyers. Of importance are: 1. vitamin-A deficiency, 2. diseases of the liver and other general pathologic conditions, 3. neurovegetative disturbances, 4. decrease of atmospheric pressure, 5. diseases of the nose and labyrinth. When a group of aviators has been transferred to a new and different environment a reëxamination of the light sense of such personnel is advisable.

F. Nelson.

Comberg, W. **The ring defect in the visual field of wearers of glasses.** Klin. M. f. Augenh., 1941, v. 107, Dec., pp. 585-589.

An inherent defect exists in spectacle lenses which is well known but possibly generally neglected when considering a patient's difficulties in accustoming himself to his first glasses. A concave lens reduces the image of that part of the object which is seen through it. Consequently a second image of those parts of the object which are seen through the marginal zone of the lens is seen just beyond the limits of the lens. This produces a diplopia which is sometimes disturbing. A convex glass enlarges the image, consequently the part of the image seen through the marginal zone of the lens overlaps the adjacent image and produces a zone of blurring which in effect cuts out a portion of the object. Comberg has measured and recorded graphically the distance at which glasses of varying dioptric power cut out (+ lens) or duplicate (− lens) a zone 20 cm. wide, roughly the size of a human head. (2 graphs.)

F. Herbert Haessler.

Costi, C. **Nocturnal myopia, suggestions of ophthalmic interest.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, July-Aug., pp. 621-627.

Nocturnal myopia is defined in the following way: When the brightness of an object observed by an eye of normal accommodative power is low, the distance of the punctum remotum is reduced. The average value obtained is two diopters, that is, the eye is made myopic to that degree. The test demonstrating this phenomenon is made by projecting a luminous cross on a screen. With ordinary illumination the cross is seen clearly, but as the illumination is reduced the cross becomes blurred. The cross is again seen clearly as minus lenses are introduced up to two diopters.

The fact that neither atropinized eyes nor eyes with advanced presbyopia show the phenomenon seems to indicate that the mechanism is accommodative. Based on the above observation the assumption is that eyes of normal accommodative power have from 1.5 to 2.00 diopters of negative accommodation. A practical application is cited. A myopic chauffeur who had normal vision in the day time with glasses of −2.00 D. complained of seeing poorly at night. It was found, that by increasing the strength of his glasses to −3.25 he saw very well and without fatigue for prolonged night driving. (3 figures.)

J. Wesley McKinney.

Crawford, J. S., Shagass, C., and Pashby, T. J. **Relationship between visual acuity and refractive error in myopia.** Amer. Jour. Ophth., 1945, v. 28, Nov., pp. 1220-1225. (5 tables, 2 figures, references.)

Drews, L. C. **A new visual-test cabinet.** Amer. Jour. Ophth., 1945, v. 28,

Oct., pp. 1138-1140. (2 illustrations.)

Göthlin, G. F. **Inheritance of congenital total color blindness with photophobia.** Acta Ophth., 1941, v. 19, p. 202.

The author refers to his publication in 1924 on this subject, which gave some indication of the fact that congenital total color blindness with photophobia was probably of a hereditary nature. At that time, however, the literature did not contain a family tree in which this heredity was directly demonstrable. Nettleship's report of 1880 the author does not consider sufficiently reliable, because the family contains in addition amaurotic idiocy and mental defects. It was obvious, however, from the available material that this anomaly was not inherited as a dominant, and if its heredity was recessive it was not sex linked. In the present study the author tabulates the compiled material of this century, which consists of 41 publications, reporting on 41 families, with a membership of 254, and 76 affected members. A report of three family trees, with one homozygotic and one heterozygotic parent, shows a membership of 16, with 9 affected. Statistical analysis of these tables shows that total color blindness with photophobia may be transmitted to future generations. The heredity is recessive and not sex-linked. The author's figures show preponderance of women among those involved; this does not agree with the findings of Nettleship, Peter, and Waardenburg, who found preponderance of men. The author attributes the discrepancy to inadequacy of material at the disposal of the former investigators. Consanguinity among parents was found in 32 or 33 percent of the European families.

Because of sex-linked inheritance of partial color blindness and the recessive inheritance of total blindness, the type of heredity in an atypical case may determine whether we are dealing with a severe case of partial color-blindness or a mild case of total color-blindness with photophobia.

Ray K. Daily.

Jancke, G., and Holst, A. **Influence of heredity and environment on the development of refraction in twins.** Klin. M. f. Augenh., 1941, v. 107, Oct., pp. 373-389.

This study is based on the measurement of corneal curvature in 140 pairs of twins (72 single-ovum, 68 two-ovum) and of the total refraction of 60 pairs of twins of each kind. The striking preponderance of concordance of findings in single-ovum twins demonstrates the heredity of refractive states. This is true for hyperopia, emmetropia, and myopia alike, though astigmatism seems to be influenced somewhat by environmental factors. Environmental factors do not produce changes that increase with age. Near work in no way alters the development of the refractive state even in myopia. School myopia in any genetic sense does not exist. The name "school myopia" indicates coincidence in time only and should be dropped because it is misleading. (6 tables, references.)

F. Herbert Haessler.

Györffy, S. **The role of the fluid used for filling contact lenses.** Klin. M. f. Augenh., v. 108, May-June, p. 328.

Solutions used for filling the space between a contact lens and the cornea have to fulfill certain physical and chemical requirements. The refractive index must approximate that of the cornea and chamber fluid; i.e., 1.335. Chemically the solution must resemble

the tears in composition and pH, and be isotonic with them. The pH of tears varies between 7.0 and 8.4, and the values in an individual can be established with sufficient accuracy by the use of a colorimetric indicator paper of which a narrow strip is put into the lower cul-de-sac. Several buffer solutions have been advocated, and the required mixtures for the various degrees of pH are given in form of a chart. The pH may change with the length of time a contact lens is worn. Since the gaseous exchange of the cornea is eliminated to a high degree when it is not in contact with the air, a lack of oxygen and increase of CO_2 between contact lens and cornea will result in a shifting of the pH towards the acid side. When plastic contact lenses are used the author frequently noticed a rather sudden decrease of visual acuity which was caused by incomplete wetting of the inner surface of the lens, leaving small dry areas. They are probably caused by peculiar surface tension between the plastic material and the fluid. Certain protein preparations as caseosan, actoprotin and especially lamepon were used satisfactorily in the attempt to lessen the surface tension. (References.) F. Nelson.

Karpe, G. **The fitting of spectacle lenses.** Klin. M. f. Augenh, 1942, v. 108, Jan.-Feb., p. 80.

The author presents a mathematical and general practical discussion of the general principles of fitting glasses, including measuring of pupillary distances, adjustment of glasses, properly centered and at a proper distance from the corneal vertex. Karpe also discusses in detail the influence of the presbyopic additional near correction on the convergence of the eyes and the prismatic effect of decentration. Since it is not possible to give an understandable account of the various mathematical calculations without presentation of the accompanying tables and charts it is recommended that one read the article in the original for additional information. (4 figures, 4 charts.) F. Nelson.

Kayser, B. **An attack of total color blindness accompanied by sensation of unusual brightness and scintillating scotoma.** Klin. M. f. Augenh., 1942, May-June, p. 362.

The author experienced a rare phenomenon consisting of complete sudden extinction of the color perception during the day in a normally lighted room. While all color values disappeared in the faces of three persons with whom he was talking, everything became unnaturally bright. The phenomenon lasted for five minutes and was not accompanied by scintillation. He believes it probable that a vasomotor spasm occurred in identical areas of the subcortical region of the right and the left occipital lobes of the brain. The author also had innumerable attacks of scintillating scotoma during his long life, sometimes 2 or 3 during one day but never accompanied by headaches or vomiting. On one occasion he experienced a colored scintillating scotoma while walking briskly in the dark. Suddenly bundles of fiery colored rays appeared before both eyes shooting upwards like beautiful fireworks. After five minutes the phenomenon disappeared and was not followed by headache or malaise. The vision was not impaired and the phenomenon never recurred.

F. Nelson.

Lisch, K. **On the question of the**

genesis of myopia. Klin M. f. Augenh., 1941, v. 106, June, pp. 695-699.

In the last five years most oculists have come to believe that myopia is not produced by exogenous factors but congenitally. Recently Lindner has resurrected the old concept of "school myopia" and has suggested that the only way to come to a definite conclusion is to separate single-ovum twins before they go to school so that one may be sent to a village school and allowed to become a peasant while the other is trained for the life of a scholar. This program could hardly be carried out, but Lisch has records of two pairs of single-ovum twins in which the conditions of this experiment were approached though it had not, of course, been planned.

Of a pair of sisters aged 30 years, of peasant stock, one become a seamstress after leaving primary school and the other an agricultural worker. Each developed high myopia which was greater in the right eye—namely, 17.00 and 11.00 D. combined with a small cylinder in the eyes of the seamstress, and 16.00 and 13.00 D. in the agricultural worker.

In each of the other pair of twins a high myopia of approximately equal amount occurred, suggesting a hereditary factor though there was no difference in their environment or activity as required for Lindner's "experiment." (References.) F. Herbert Haessler.

Matas, Carreras. **New procedures for the subjective correction of ocular astigmatism.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Sept.-Oct., p. 733.

This article contains a detailed explanation of the physiologic optics involved in use of the astigmatic dial. The subjective test as used by Matas is based on the mathematical rules applied by Lindner to cylinder retinoscopy. Instead of the astigmatic band in the pupil which serves as the indicator in retinoscopy, the blackest line on the dial as seen by the patient serves as indicator in this test. If the axis of the correcting cylinder corresponds exactly to the axis of ocular astigmatism as indicated by the patient, the correction is simple. If, however, the axis of the correcting cylinder deviates from the axis of ocular astigmatism, the two cylinders placed at oblique axes to each other give rise to a new cylinder the axis of which will be somewhere in the acute angle formed by these two axes, and the patient will then see blackest another line, the axis of which will not coincide with the line which he saw blackest originally nor with a line perpendicular to it. The position of this new line, just as the position of the astigmatic band in retinoscopy, indicates the relative strength of the correcting cylinder to the patient's astigmatism, and the direction in which the correcting cylinder is to be moved to coincide with the axis of the ocular astigmatism. This technique, the author claims, has the merit of Marquez's bicylindric refraction, in that it relaxes the ciliary muscle through constant and rapid variation in strength and axis of the cylinder. Ray K. Daily.

Meitner, H.-J. **Peculiar case of anomaly of "blue sense."** Klin. M. f. Augenh. 1941, v. 107, Sept., p. 293-301.

Meitner records congenital lack of blue perception in the eyes of a man with otherwise normal findings (except an unspecified refractive error). In the whole color circle blue, blue-violet, and violet were seen as neutral gray. Purple-red was seen as red. Rayleigh's equation was correct and Ishihara's pseudoisochromatic tests normal. On Nagel's charts yellow and blue were

differentiated, the latter being called gray. The case is probably one of atypical tritanomaly. Typical tritanopia could be ruled out. (References.)

F. Nelson.

Mihályhegyi, G. **Improvement of visual acuity with contact glasses in the presence of lesions of retina and choroid.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 200-205.

In seven nearsighted patients with fundus lesions the correction of the refractive error by means of contact glasses gave much greater visual acuity than correction with ordinary lenses, presumably because a contact glass magnifies the image in a myopic eye. (References.) F. Herbert Haessler.

Oberhoff, Kurt. **Hyperopic astigmatism and hyperopia in single-ovum twins.** Klin. M. f. Augenh., 1941, v. 107, Dec., pp. 577-580.

Oberhoff reports refraction of two pairs of single-ovum twins. The findings are in harmony with the theory that the refractive state is congenital. (3 figures.) F. Herbert Haessler.

Paterson, A., and Zangwell, O. L. **Disorders of visual space perception associated with lesions of the right cerebral hemisphere.** Brain, 1944, v. 67, Dec., p. 331.

The authors describe the case histories of two men who received compound fractures in the right parieto-occipital region. Damage from contusion was minimal. The angular gyri were injured. Of interest are the high grade visual and constructional disabilities which appeared after recovery from the injury. The disabilities were of three main types: 1) Unilateral visual symptoms: impairment of visual perception, relative hemianopia and disorientation, and a tendency to neglect the left half of visual space. 2) Oculomotor symptoms: abnormalities of oculomotor coördination in reading and other tasks which demand a regular pattern of sequence of eye movements. 3) Visual constructive disabilities: a complex disorder affecting perception, appreciation, and reproduction of spatial relationships in the central field of vision. R. Grunfeld.

Sánchez Mosquera, M. **Myopia corrected surgically.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, July-Aug., pp. 628-630.

Two cases of myopia were operated upon by excision of a strip of conjunctiva 6 or 7 mm. wide all around the limbus and 3 mm. from it. In the first case the myopia was reduced from −1.50 D. each eye to −.50 O.D. and −.12 O.S. In the second case the myopia was reduced from −1.75 to −.25 O.D. and from −4.75 to −3.75 O.S. The mechanism of this lessening of myopia was thought to be a flattening of the anterior segment of the globe by cicatricial contraction in the region of the excised conjunctiva.

J. Wesley McKinney.

Schumann, **A rhythmic phenomenon in the field of vision.** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 97.

The author observed the appearance of a subjective light phenomenon in his visual field which consisted of groups of numerous small stationary red discs of different sizes, and fine scintillating bluish specks. Two pairs of such groups are visible in the visual field of each eye. The phenomenon appears and disappears in rhythmic intervals, increasing for 2-3 seconds, clearly visible for 3-4 seconds, gradually disappearing within 13-19 seconds

and then starting again. The author has been observing this phenomenon for about sixty years and does not think that it is a hallucination. (2 drawings) F. Nelson.

Sloane, A. E. **Refraction clinic.** Amer. Jour. Ophth., 1945, v. 28, Nov., pp. 1259-1260.

Strebel, J. **Morphology and genesis of posterior sclerectasia in high myopia and the inheritance of myopia.** Klin. M. f. Augenh., 1941, v. 107, Aug., pp. 179-193.

Posterior sclerectasia or staphyloma posticum verum must be very rare because in recent discussions of the topic in works like the Kurzes Handbuch the author of the article does not even have an illustration of his own. Strebel refers to the literature and his own early description and now adds eight illustrations which he himself drew from patients in his care.

Most staphylomas are partial but an occasional one is total. Usually they involve the nasal side of the disc, more rarely they are temporal, and the latter are almost always bilaterally symmetrical. The nasal ones are often in the form of multiple terraces on which the vessels descend as cascades. The fundus is usually pale so that the choroidal vessels are visible. The lesion is almost always associated with a disturbance of macular pigmentation and often with other congenital lesions such as cataract and persistent pupillary membrane. Heredity is usually demonstrable.

The pathogenesis of staphyloma as well as the extreme myopia which accompanies it is clear from consideration of the above clinical material. There can be no question of mechanical stretching of the bulbus. The lesion is purely an inherited degenerative form for which we have to thank our domestication. The author describes the embryologic development of the eye and shows how these lesions may be formed. He points out that belief in purely mechanical factors in morphogenesis, such as for example the theory that invagination of the primary optic vesicle is induced by pressure from the developing anlage of the lens, must be abandoned. All the processes of development result from imminent directives of growth which are controlled by the hereditary constitution of the developing individual.

This leads Strebel to some remarks on his convictions about the hereditary origin of myopia. The extreme degrees which are associated with degenerative changes at the posterior pole of the eyeball are usually fully developed in earliest childhood, and he classifies them as stable. The individuals with the more common and more moderate degree of myopia, which he classifies as labile or dynamic, also inherit the tendency toward nearsightedness, but environmental factors play some part in the amount of myopia which develops. Strebel himself has demonstrated the association of disturbances in calcium metabolism with the development of myopia, and there is evidence that the type of individual that is apt to develop myopia has also a poor development of connective tissues. Pressure of the lids may play a part and so does the tension of the extraocular muscles. Strebel has demonstrated that the asymmetries of the globe are directly proportional to frequency of use of the muscle which lies in the area of deformation. (9 figures, including 3 color plates.) F. Herbert Haessler.

Sysi, R. **Investigation as to the effect**

of vitamin B_1 on accommodation. Klin. M. f. Augenh., 1941, v. 107, Sept., pp. 301-306.

A preliminary report on experiments with 26 normal emmetropic individuals, between 26 and 69 years of age, whose range of accommodation was tested before and after injection of vitamin B_1. In younger persons as well as those over 61 years practically no effect was observed. In some persons of prepresbyopic and presbyopic age a definite increase in range of accommodation could be found within a half hour after injection; and this increase lasted for 24 hours or longer. The effect disappeared gradually within four or five days. The refraction never showed any change during the period of observation. The mechanism is not yet completely explored. (One table, references.) F. Nelson.

Trendelenburg, Wilhelm. **Inheritance in a case of anomalous color sense in one and normal color sense in the other eye.** Klin. M. f. Augenh., 1941, v. 107, Sept., pp. 280-293.

The patient, a physician, had been examined by Kries more than twenty years previously, when his left eye had been found normal as to color sense, the right deuteranomalous. The unilateral anomaly was congenital. The same condition was found in 1941. No color-sense abnormalities were known in the ascendants. The man's daughter, 17 years of age, was found deuteranomalous in both eyes; and the son, six years old, deuteranopic in both eyes. The children's mother was phenotypically normal but was, of course, a transmitter of deuteranopia. (Bibliography.) F. Nelson.

Tron, E. **Posterior principal plane of the optical system of the eye and significance for refraction** Arch. of Ophth., 1935, v. 34, Aug., pp. 107-111.

Measurements were made on 275 eyes to determine the significance of the position of the posterior principal plane on refraction. The radius of corneal curvature was measured with the Javal ophthalmometer. The radiuses of curvature of the surfaces of the lens, the depth of the anterior chamber and the thickness of the lens were measured with the Tscherning ophthalmophakometer. The position of the posterior focus and the length of axis were calculated on the basis of the data obtained from these determinations after refraction under atropine cycloplegia.

It was found that the position of the posterior principal plane varied within the limits of 1.06 to 2.51 mm. The average value was 1.63 mm. The position of the posterior principal plane is the same with various types of refraction. The greater the refractive power of the eye and of the lens, the farther the posterior principal plane is situated from the cornea. The length of axis has no effect on the position of the posterior principal plane. A special kind of ametropia was noted in 1.85 percent of the eyes, in which a refractive anomaly resulted from the position of the posterior principal plane in the optical system.

Changes in the position of the posterior principal plane are of no importance for the genesis of anisometropia and changes in both eyes are inconsiderable in isometropia.

John C. Long.

Weber, Ernst. **Heredity of refraction on the basis of studies in twins.** Klin. M. f. Augenh., 1941, v. 107, Dec., pp. 574-577.

Weber reports the refraction of five pairs of twins, each pair of which certainly or very probably arose from a single ovum. The results confirm Steiger's teachings. Refractive state is a manifestation of growth-regulating factors. Twins with concordant anisometropia particularly suggest that refraction is determined by the constitution of the germ plasm, and not mechanistically. (2 illustrations.)

F. Herbert Haessler.

Wölfflin, E. **Trifocal lenses and their application in practice.** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 95.

Presbyopic people engaged in certain occupations and professions such as librarians, musicians, artists, surgeons, and dentists are sometimes not completely satisfied with simple bifocal glasses. Correction for an intermediate range is often desirable. Wölfflin describes the types of trifocal lenses produced by Bausch & Lomb. (2 drawings.)

F. Nelson.

4

OCULAR MOVEMENTS

Adler, F. H. **Effect of anoxia on heterophoria and its analogy with convergent concomitant squint.** Arch. of Ophth., 1945, v. 34, Sept., pp. 227-232.

In a previous paper by the author, the existing knowledge of the voluntary and motor mechanisms controlling ocular movements was summarized. The chief source of reflex tone is the visual fixation reflex. All of the other sources of tone, together with the visual fixation reflex, suffice to keep the eyes in alinement with each other. When the visual fixation reflex is artificially eliminated by one means or another and the position of the eyes is measured, one is determining the effect of all these other sources of tone working together. This is spoken of as the measurement of the muscle balance. One must conclude therefore that heterophoria is an indication that the remaining reflex sources of ocular muscle tone have failed to keep the eyes in perfect alinement when the fusional mechanism is eliminated.

It has been known for some time that under the influence of alcohol there develops an increasing esophoria, which, with increasing loss of the fusional fixation reflex becomes an esotropia. A similar development of esophoria has been found to occur from the effect of anoxia by Velhagen. Since this was contrary to what Berens and Wilmer had previously reported, Adler repeated these experiments.

The experiments reported here were made in a low-pressure chamber. From the data collected he concludes that during the lack of oxygen, there is a shift of the range of fusion toward the convergent position. The range itself shows little change in the normal subject who has a normal range of fusion. If the range is abnormally small to begin with, it may be wiped out altogether, and homonymous diplopia may develop.

The development of exophoria under the influence of alcohol and anoxia is due either to an increase in convergence tone or to a diminution of divergence tone. There is no evidence in the literature or in the data presented here which points strongly to either assumption.

The esophoria produced by alcohol and anoxia, which may even become esotropia, may not be the same as that which occurs in early childhood and which leads to concomitant squint, but there is enough similarity in the two

conditions to suggest study of squint from this point of view. Both are caused by some interference with a supranuclear mechanism.

R. W. Danielson.

Borley, W. E., and Renaud, O. V. **Advancement of superior oblique muscle for correction of diplopia.** U. S. Naval Med. Bull., 1945, v. 45, Oct., p. 755.

A case of paresis of the superior oblique resulting in 20 prism-diopters of hyperphoria with severe head tilting is presented. The muscle was shortened by Wheeler's method with good results.

Morris Kaplan.

Costenbader, F. D. **Causes of failure in the treatment of squint.** Amer. Jour. Ophth., 1945, v. 28, Oct., pp. 1123-1131. (1 table, references.)

Gillan, R. U. **An analysis of one hundred cases of strabismus treated orthoptically.** Brit. Jour. Ophth., 1945, v. 29, Aug., pp. 420-428.

The study of 100 cases of strabismus was undertaken to compare the deviation and the degree of binocular vision present at the conclusion of treatment with that present at the commencement.

Sixty-three cases were treated by orthoptic treatment only. Twenty-three of these became perfectly straight. The original deviations were from 3° to 25°—average 10°. Twenty-five became almost straight, the final deviation being less than 5°. In these cases the original deviations were from 3° to 20°—average 10.35°. Fifteen did not become straight, the final deviation being over 5°. In these cases, the original deviations were from 10° to 30°—average 16.8°. The percentage of complete success in this group of deviations is 36.5 percent.

Thirty-six of the 63 cases developed good binocular and stereoscopic vision as tested by the synoptophore, cover testing, and Worth's lights. All of these commenced with simultaneous perception and fusion. Seven cases developed fair stereoscopic vision and 20 developed no stereoscopic vision. Of the 23 cases which became straight, all commenced with simultaneous perception and fusion. It would appear, therefore, that the development of orthopsis by means of orthoptic treatment alone depends to a large extent upon the degree of binocular vision present at the commencement of treatment as well as upon the degree of deviation. The possession of simultaneous perception and fusion is an essential prerequisite for success.

Thirty-seven cases were treated by orthoptic treatment plus operation. Six of these became perfectly straight, the average deviations being from 20°-35°—average 29°. Seventeen became nearly straight, the final deviation being 5° or less, the original deviations being from 15° to 60°—average 33.1°. Fourteen cases did not become straight, the final deviations being over 5°, average original deviation 35.8°.

Of the 100 cases, 25 became fully straight and fully stereoscopic, 20 became almost straight and fully stereoscopic, 26 became straight or almost straight without becoming fully stereoscopic, and 29 became neither straight nor stereoscopic.

In order to meet the criticism that perhaps some of the cases might have become straight without treatment, the results were checked against a series of comparable cases which had no treatment except the wearing of

glasses. In a series of 50 cases under observation for an average of nine months, there was not one in which orthopsis or stereoscopic vision was developed.

Those cases having simultaneous perception and fusion to commence with and developing good stereoscopic vision form the majority of cases becoming straight. It would appear, therefore, that the absence or failure of stereoscopic vision is the chief factor in the causation of concomitant strabismus. Edna M. Reynolds.

Leoz, G. **Perverse phenomenon of Bell or of Fuchs.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, July-Aug., pp. 539-547.

In this case the eyes turned downward instead of upward on forcibly opening the lids. The author discusses the nervous mechanism of the normal Bell's phenomenon.

J. Wesley McKinney.

López Domínguez, Bernabé. **Functional and cosmetic results of the treatment of convergent strabismus.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Sept.-Oct., p. 842.

The surgical pattern followed by López consists of tenotomy of the internus of the nonfixating eye, followed, if inadequate, by tenotomy on the other eye. Slight over- or undercorrections are left alone. Marked undercorrection is dealt with by advancement of the externus of the nonfixating eye. The author has not had a case which required bilateral advancement in addition to bilateral tenotomy. He uses no bandage after tenotomy, but atropine is instilled to abolish accommodation. He does not regard tenotomy as a simple procedure, and reports one case in which severe retrobulbar hemorrhage compressed the optic nerve and produced blindness of the fixating eye. He finds the result of tenotomy better if the conjunctival incision is horizontal instead of concentric with the limbus. In some cases vertical deviation followed tenotomy. This should be corrected with lenses, lest it interfere with development of binocular vision.

Ray K. Daily.

Marín Amat, M. **Inverse Bell's sign.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, July-Aug., pp. 534-538.

A case is reported wherein the eyes turned directly downward on attempted closure of the lids and in sleep, instead of upward as in the true Bell's phenomenon. A 45-year-old man had a cicatricial ectropion of the left upper lid of five years' duration. The lid border had been drawn up to the eyebrow as a result of an old fistula of the frontal sinus at the orbital rim. There was lagophthalmic keratitis of the upper cornea. In forcible closure of the eyes (impossible of accomplishment in the left eye) and in sleep, the eyes rotated downward so that the corneas were completely hidden by the lower lids. The phenomenon is explained as at first a voluntary protective movement and later an educated reflex pattern. (3 figures, references.)

J. Wesley McKinney.

Moron y Ruiz, José. **A controlled suture for muscular advancement.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Sept.-Oct., p. 839.

For traumatic diplopia due to paralysis of the externus, the author places a loop over each end of the muscle including the conjunctiva, passes the suture through the episclera close to the limbus, and tightens it slowly as the patient fixates a line; when the patient

states that he has no diplopia the suture is tied. In strabismus this suture is inserted, a tenotomy of the antagonist is performed, and the suture tied when the visual lines appear parallel. The writer claims for this suture the advantages of the Lagleyze and Worth sutures, it being as easy to regulate as is the Lagleyze suture, and having as firm a hold on the muscle as the Worth suture. (Illustration.)

Ray K. Daily.

Muck, O. **The cause of miners' nystagmus and suggestions for further research in this field.** Klin. M. f. Augenh, 1942, v. 108, Jan.-Feb., p. 67.

The cause of nystagmus of miners has not yet been satisfactorily explained. The inadequate illumination, pathologic conditions in the labyrinth, the "unnatural" gaze upwards in narrow shafts as well as the intoxicating influence of various gases in poorly ventilated coal mines are factors which have been suggested by various authors. The inhaling of certain gases (ether, chloroform) exerts a temporary inhibitory influence on different types of nystagmus. Temporary disappearance of central nystagmus has been seen after consumption of alcohol. On the other hand spontaneous nystagmus can be produced by alcohol and veronal. Among the gases most frequently found in coal mines methane may have something to do with the occurrence of miners' nystagmus. However, lack of oxygen sometimes makes nystagmus disappear, and in other instances a miner's nystagmus that had been present underground only reappeared above ground after compression of both jugular veins. Nystagmus can be inhibited by the same agents that are able to induce it. Muck's opinion is that the methods of examination used by nerve, eye, and ear specialists, which hitherto have been quite different, should be standardized and made uniform in order to establish comparable conditions. He proposes that young men who intend to become coal miners should submit to preliminary tests, wherein they inhale air mixtures from ill-ventilated coal mines in order to find out whether such mixtures are intoxicating to these individuals. (References.) F. Nelson.

Ohm, J. **Optokinetic nystagmus in very dim illumination.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 187-195.

The author reminds the reader that optokinetic nystagmus is a function of the peripheral retina. Since the nystagmus can be inhibited by placing minute objects that stimulate central fixation before the revolving drum, this procedure may be used as an objective measure of visual acuity. Optokinetic nystagmus induced in dim light, the intensity of which can be measured, may be used as a means of measuring a patient's light sense objectively. He describes the necessary modifications of his older armamentarium, and gives evidence that the method is reliable. (7 graphs, references.)

F. Herbert Haessler.

Ribas Valero, Ramón. **Diplopia in paralysis of the vertically acting ocular muscles.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, July-Aug., pp. 475-533.

This is an exhaustive study of diplopia in vertical-muscle paralysis and does not lend itself to abstracting. (2 diagrams.) J. Wesley McKinney.

Wagman, O. H. **Resection of the inferior oblique muscle in hypotropia.**

Amer. Jour. Ophth., 1945, v. 28, Nov., pp. 1226-1236. (5 figures, references.)

5

CONJUNCTIVA

Baraff, A. A. **Gonorrheal ophthalmia neonatorum**. Illinois Med. Jour., 1945, v. 87, May, p. 249.

A case of gonorrheal ophthalmia neonatorum is presented which terminated in blindness and which, probably, could have been avoided if the proper therapeutic measures had been instituted. The case, in spite of the state laws, has never been reported to the local health authorities.

R. Grunfeld.

Bernasconi, S. F. **Gonococcic conjunctivitis treated locally with penicillin.** Arch. Chilenos de Oft., 1945, v. 1, Jan.-Feb., pp. 18-19.

The author reports his rapidly successful treatment of bilateral ophthalmia neonatorum in an infant aged nine days. A solution containing 1,000 Oxford units per c.c. was instilled every hour, and the bacteriologic condition was recorded every two hours. In 7½ hours palpebral edema had disappeared and the secretion had become scanty. In 24 hours there was no secretion and the conjunctiva was normal in appearance.

W. H. Crisp.

Bland, J. O. W. **The etiology of trachoma.** Brit. Jour. Ophth., 1945, v. 29, Aug., pp. 407-420.

The two theories of the etiology of trachoma—the virus theory and the rickettsial theory—are not incompatible. Evidence is presented which proves that trachoma is a specific infectious disease, not caused by any cultivable bacterium, but by a filter-passing agent which is identical with the elementary and initial bodies found in the Prowazek-Halberstaedter inclusions and bearing a close natural relationship to the viruses of inclusion conjunctivitis, lymphogranuloma inguinale, and psittacosis.

The view is advanced that these agents stand in an intermediate position between the rickettsia and the large viruses and may form a biologic link between them. They are classified by the author as basophilic viruses. (Bibliography.)

Edna M. Reynolds.

Chulia, Vicente. **Repair of an extensive posterior symblepharon.** Arch. de la Soc. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1070.

A case of extensive symblepharon between the upper lid and eyeball covering almost the entire cornea was repaired in the following manner: The adhesion was separated; the cornea was cleared as in a pterygium; the conjunctival scar tissue was excised, the bulbar defect next to the cornea was closed by undermining the adjacent conjunctiva, liberating two flaps and bringing them together. The rest of the bulbar defect was covered by a mucous-membrane flap from the mouth. A silver prosthesis was introduced between the lid and the globe. The result was satisfactory. (Illustrations.)

Ray K. Daily.

Dollfus, M.-A. **Value of phlyctenular conjunctivitis in the detection and prophylaxis of infantile tuberculosis.** Arch. d'Opht., 1941-1942, v. 4, no. 1-2, p. 26.

Dollfus reports 51 cases of phlyctenular conjunctivitis and is convinced of the tuberculous nature of the disease. In his series the tuberculin reaction

was positive in 49 cases and clinical and X-ray examination showed evidence of osseous or pulmonary tuberculosis in all of them. Some of the patients were already under treatment for tuberculosis and the phlyctenulosis appeared to coincide with a recrudescence of the disease. The author recommends that every child with phlyctenulosis have thorough clinical and X-ray examinations as well as a tuberculin test, and that a careful search be made for carriers of the disease in the family.

Phillips Thygeson.

Feigenbaum, A., Michaelson, I. C., and Kornblüth, W. **Epidemic keratoconjunctivitis in the Middle East.** Brit. Jour. Ophth., 1945, v. 29, Aug., pp. 389-406. (See Section 6, Cornea and sclera.)

Fliri, Adolf. **Parinaud's syndrome caused by the virus of infections laryngotracheitis of chickens.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 176-179.

In the course of a few months the author observed 12 cases of typical Parinaud's syndrome in people working with a flock of chickens afflicted with chicken pest. A veterinarian identified the disease as infectious laryngotracheitis.

F. Herbert Haessler.

Gersh, I., and Reich, N. E. **Arthritis, urethritis, and conjunctivitis (Reiter's disease).** Urologic and Cutaneous Rev., 1945, Aug., p. 472.

The authors report a case of Reiter's disease exhibiting the triad arthritis, urethritis, and conjunctivitis. Physical examination of a soldier, 19 years of age, revealed bilateral conjunctivitis with a crusted yellow discharge, marked effusion into both knee joints with moderate pain and stiffness, and a profuse urethral discharge. The urethral meatus was red and pouting. Smears and cultures of the urethral discharge revealed nonhemolytic Staphylococcus albus. The conjunctival discharge contained nonhemolytic Staphylococcus aureus. The joint fluids were free from organisms. Injection of the urethral discharge into a male guinea pig was followed by the development of a purulent urethritis but by neither eye nor joint involvement. The organism of this urethral discharge was proved to be nonhemolytic Staphylococcus aureus, and the authors consider this organism to be the etiology of Reiter's disease.

Neither sulpfathiazole nor penicillin proved to be therapeutically effective.

R. Grunfeld.

Jacobson, M., and Levin, N. **Epidemic keratoconjunctivitis cured through the combination of penicillin and sulfasuxidene.** New York State Jour. Med., 1945, v. 45, Sept. 15, p. 1990. (See Section 6, Cornea and sclera.)

Lijó Pavía, J. **Burn of the cornea and conjunctiva. How to prevent symblepharon.** Rev. Oto-Neuro-Oft., 1944, v. 19, Nov.-Dec., pp. 159-171.

The paper is prefaced by a very complete discussion of the views of other writers. The substances most commonly causing corneal and scleral burns are lime, ammonia, acids, and hot or molten metals. The degree of reaction depends on the severity of the burn. The results from this type of burn are hyperemia and edema, cauterization, necrosis, granulation, and finally cicatrization with adhesions.

A young adult suffered a severe

burn of the lids, cornea, and conjunctiva, from flaming naphtha. After immediate and abundant irrigation and local anesthesia, a mold of surgical "Korina" (amidoazotoluol) at a temperature of 45° to 47°C., was placed in the eye over the cornea, extending to both fornices. Atropine ointment was added. After 11 to 13 days sufficient healing and epithelization had occurred to allow removal of the mold. No permanent adhesions formed. Vision remained at 0.3. The author prefers this mold and atropine ointment to mucous graft, interposition of rabbit peritoneum, or contact lens. (7 illustrations, references.) Edward Saskin.

Lucas, R., and Weiss, H. **Gonorrheal syndrome without gonorrhea.** Arch. of Ophth., 1945, v. 34, Aug., pp. 97-98.

The triad of urethritis, conjunctivitis, and arthritis, occurring in this order, in the absence of a gonococcic etiology, is known as Reiter's disease. The anterior and posterior urethra are involved and often the bladder. The symptoms are so similar to those of gonorrhea that suspicion of the gonococcus is difficult to dispel. An acute purulent conjunctivitis is a constant finding. A tendency to spontaneous recovery without corneal ulceration is the rule. Keratitis and iritis often occur. Chronic arthritis is usually the cause of the severest complaint. The arthritis involves more than one joint and clears up in from one to five months without ankylosis. Cutaneous lesions may be simple erythemas, urticarial or erythema-nodosum-like eruptions, hemorrhagic and vesicular eruptions or hyperkeratitic lesions. The disease cannot be distinguished from gonorrhea clinically. Failure to demonstrate the gonococcus is the differentiating feature. The condition does not respond to penicillin or sulfadiazine nor to any other known specific remedy. Complete recovery is the rule.

The authors report a case of Reiter's disease in a 29-year-old man developing 10 days after exposure. An acute urethritis developed first and was followed in three weeks by a severe purulent conjunctivitis. Arthritis of the toes, fingers, wrist, heel, and knee developed. Coincident with the arthritis a cluster of superficial vesicles were noted in the center of each cornea. Iritis with keratitic precipitates developed in each eye. Hemorrhagic vesicular cutaneous lesions appeared. Within two months all symptoms had gone. Administration of sulfathiazole and penicillin had no positive effect on the disease. Repeated conjunctival and urethral smears, as well as urethral, blood, and synovial-fluid cultures were all negative for the gonococcus.

John C. Long.

Paez Allende, Francisco. **Concerning a case of diffuse neurofibromatosis of the bulbar conjunctiva (Recklinghausen's disease) with skeletal and cutaneous manifestations, asymmetry of the body and intracraneal involvement.** Arch. de Oft. de Buenos Aires, 1943, v. 18, Sept., pp. 438-453. (See Amer. Jour. Ophth., 1945, v. 28, Aug., p. 933.)

Poleff, L. **The real value of treatment by sulfonamides in trachoma.** Ophthalmologica, 1943, v. 105, March-April, pp. 156-174.

After reviewing the literature on the subject the author expresses the opinion that sulfanilamide acts in trachoma through bacteriostasis with subsequent destruction of the virus by phagocytosis. The drug has no resorbing

effect on the follicles and is, therefore, not a cure-all for trachoma. While it is of great value in clearing the infection and the corneal complications, it should be used only in conjunction with local therapy. Based on the observation of 1,050 cases of trachoma in Morocco the author recommends vigorous massage treatment of the conjunctiva with glass or silver stick for several months, eventually preceded by an expression of the follicles. During the same time sulfonamides are given by mouth. It is only in very early cases with little formation of follicles that sulfonamides alone may be sufficient. In the fully developed cases the combined treatment is the method of choice and will arrest the average case in three months. Sulfanilamide effects a sterilization of the infection and is the best precaution against recurrences. (Bibliography) Max Hirschfelder.

Rössler, F. **The treatment of trachoma with cold applications.** Klin. M. f. Augenh., 1942, v. 108, May-June, p. 365.

Davids has reported that application of snow or ice to the trachomatous conjunctiva has a healing influence on the inflammatory process but Rössler had published the results of such experiments carried out in 1912. They were not encouraging. Though it is well known that cold applications reduce the acute irritation of a fresh case of trachoma, this does not mean that such applications can heal the disease. F. Nelson.

Schmelzer, H. **Allergic conjunctivitis and pervitin.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 179-184.

In two patients with characteristic allergic conjunctivitis in the course of hay fever, a variety of the usual symptomatic remedies failed to give relief. There was an immediate favorable response to pervitin, a drug whose structural formula resembles benzedrine and ephedrine. (References.)

F. Herbert Haessler.

Sorsby, Arnold. **Local penicillin for ophthalmia neonatorum.** Brit. Med. Jour., 1945, June 30, p. 903.

Results of local penicillin therapy in 38 cases of ophthalmia neonatorum are described. The drug was used in a concentration of 2,500 units per c.c. Thirteen cases were treated with instillations at intervals of one hour for six hours, then of two hours for 24 hours, and subsequently of three hours. All cases responded well with clinical cures in from 4 to 60 hours. Twenty-five cases were treated with instillations every five minutes until pus formation ceased, then every half hour until the eye was dry, every hour for 12 hours and every two hours for 24 hours. In two cases the response was poor but gratifying in all the others; clinical cure occurred in 38 hours at the longest and 25 minutes at the best with an average of ten hours. Infections with gonococcus, staphylococcus, streptococcus, Morax-Axenfeld and diphtheroid bacillus and inclusion blennorrhea were treated. The type or severity of the infection had no bearing upon the results. During this regimen no irrigations after an initial one are necessary as pus formation ceases within one-half to three hours. No untoward reaction to the penicillin was noted.

Morris Kaplan.

Vetter, J. **Atypical cases of epidemic keratoconjunctivitis.** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 51. (See Section 6, Conjunctiva.)

6

CORNEA AND SCLERA

Atkinson, W. S. **Interstitial keratitis treated with subconjunctival injections of penicillin.** Arch. of Ophth., 1945, v. 34, Sept., p. 233.

The author reports the case of a 27-year-old man who developed interstitial keratitis in spite of antiluetic treatment. He was given seven daily subconjunctival injections of 0.5 c.c. of sodium penicillin (1,000 Oxford units of penicillin per c.c.) The signs and symptoms subsided rapidly. Two months later when the patient was last seen, the vision was 20/15 and the eye was quiet. R. W. Danielson.

Bashoff, P. H. **The results of corneal transplantation and plastic operations.** South African Med. Jour., 1945, v. 19, June 23, p. 209.

The author describes 30 cases of keratoplasty. In the first nine cases he made transplants according to the methods of Filatov and Weiner with formalin-treated tissue. Results obtained were negligible to bad. In the next 17 cases 2-mm. auto transplants were taken from the clear portion of the recipient's corneas after the method of Morax. Results were good in 13 of the 17 cases. The reaction of the cornea to the graft of its own tissue was very slight. The last four patients had keratoconus and were treated according to the Webster Fox operation. An elliptical segment was removed from the cornea just below the pupil and the edges approximated by sutures. The cone was thus flattened and any apex scar moved below the pupil; the resulting irregularity of the whole cornea was obviated by the contact lens subsequently fitted. The final results in these cases were quite satisfactory.

Morris Kaplan.

Bischler, V. **The different forms of metallic impregnation of the cornea.** Arch. d'Opht., 1941-42, no. 3-4, v. 4, p. 114.

The case of a silversmith is presented. The right cornea showed a ring of the Kayser-Fleischer type, the left cornea an identical change except for the fact that it involved the entire extent of Descemet's membrane. An unusual feature of the case was that dark adaptation was markedly diminished. Pseudosclerosis and impregnation of the cornea with salts of gold and copper could be excluded and a diagnosis of professional argyrosis of the cornea established. The biomicroscopic appearance is given in detail, but the accompanying illustrations are poorly reproduced. A complete review of the subject of metallic impregnation of the cornea precedes the case report.

Phillips Thygeson.

Cogan, D. G., and Grant, W. M. **Keratitis due to n-butyl alcohol.** Arch. of Ophth., 1945, v. 34, Sept., pp. 248.

This additional information should be read in conjunction with a paper published by the authors in the Arch. of Ophth., 1945. v. 33, Feb., p. 106. For abstract see Amer. Jour. Ophth., 1945, v. 28, Aug., p. 935.

Edeskuty, Otto. **Ichthyosis of the cornea.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 170-176.

Congenital ichthyosis is rarely complicated by a corneal lesion. The author describes a patient with congenital ichthyosis in whom there were corneal lesions which he believes to be manifestations of the patient's congenital

defect. He found descriptions of four similar cases in the literature. The corneal lesion consists of subepithelial opacities in the superficial layers of the central area of the cornea. The opacity is nodular; there are proliferation of blood vessels and great photophobia without objective signs of irritation. An accompanying conjunctival inflammation with papillary hypertrophy may be an essential part of the disturbance. The lesion is differentiated from Groenow's nodular corneal dystrophy by the absence of corneal opacity in the deeper layers. The confluence of the opacity suggests a disciform lesion. (References.) F. Herbert Haessler.

Feigenbaum, A., Michaelson, I. C., and Kornblüth, W. **Epidemic keratoconjunctivitis in the Middle East.** Brit. Jour. Ophth., 1945, v. 29, Aug., pp. 389-406.

Three hundred and eighty one cases of epidemic keratoconjunctivitis occurring between 1938 and 1944 are reported. The epidemic occurred at the beginning of the rainy season. Trauma was found to play a considerable role in the etiology of the disease.

The incubation period appeared to be between five and fourteen days. The incidence of the disease was not affected by age, sex, or social class. No recurrence was observed, but there were exacerbations when the disease was protracted.

The subjective symptoms consisted of prickling, itching, and sensation of a foreign body in the eye, later followed by slightly blurred vision. The objective findings were lacrimation, swelling of the lids, pseudoptosis, a typical glistening of the conjunctiva (cellophane-surface appearance), marked swellings of the conjunctiva of the lower lid which were sometimes cockscomblike, swellings of the plica semilunaris and caruncle, and painful swelling of the preauricular gland, often accompanied by swelling of the submaxillary gland. Especially notable was a delicate fibrinous, threadlike secretion, such as is commonly found in spring catarrh. Conjunctival smears and cultures were negative.

The condition began bilaterally in 50 percent of the cases.

The corneal lesions were found to be of three different types: (1) ill-defined subepithelial dots, (2) superficial epithelial infiltrates some of which were vesicular and some of which stained, (3) disciform keratitis. Corneal changes were found in 60 percent of the cases and appeared from seven to seventeen days after the conjunctival changes.

The conjunctival changes gradually diminished after a few weeks, while the corneal complications persisted from a month to two and one-half years.

Energetic treatment with silver and copper salts was found to aggravate the condition. The best treatment was frequent instillation of concentrated adrenalin solution (1: 4,000) and douching with cold water. After the complete disappearance of the conjunctival changes, 2-percent yellow oxide of mercury ointment with 5-percent dionin were useful for the corneal infiltrations. Sulfonamide, locally or by mouth, did not help the condition and penicillin had no effect whatsoever. In a few cases of disciform keratitis, intravenous injection of 1 to 3 c.c. of a 10-percent solution of sodium iodide brought about rapid improvement.

Experiments with rabbits confirmed the specific nature of the causal agent.

Tissue cultures and filtration experiments showed this to be a filtrable virus. Mice could not be infected.

Immune bodies were shown to be present in the blood of convalescent human beings.

Histologic examination of human conjunctival tissue showed flattening of the epithelium, marked capillary dilatation and edema in the subepithelial tissue, and infiltration with lymphocytes and large mononuclear cells with multiple mitoses. In the chronic cases, there was marked papillary hypertrophy. (4 graphs, 3 photographs, 11 microphotograhs, references.) Edna M. Reynolds.

Garibay, C., and Cortés Zavala, A. **Keratitis nodosa due to caterpillar hair.** Anales Argentinos Oft., 1944, v. 5, Oct.-Nov.-Dec., pp. 136-138.

A young adult male felt a sharp pain in his right eye and brushed a "hairy worm" from his lids. For two months he was treated by a general physician before consulting an oculist. At this time he had edema of the upper lid, photophobia, lacrimation, conjunctival congestion, superficial punctate corneal lesions, and iritis. Slitlamp examination revealed nodular infiltration of the cornea with a fine reddish hair occupying the center of each nodule. Following extraction of the caterpillar hairs the patient was much relieved. However, intraocular infection supervened, due either to corneal perforations by the hairs, or some venom thereof. At last examination the eye was atrophic and enucleation seemed advisable. Edward Saskin.

Harley, R. D., and Kaiser, R. F. **Keratitis associated with malaria.** Amer. Jour. of Ophthal., 1945, v. 28, Dec., pp. 1309-1312.

Jancke, G. **The uniformity of epidemic forms of keratoconjunctivitis described under different terms from 1889-1941. (Keratitis punctata, nummularis, maculosa epidemica, etc.)** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 39.

First described by Fuchs during an epidemic in Vienna in the years 1885 to 1890 under the name keratitis punctata superficialis, apparently the same or a very similar disease was reported during the same epidemic by Stellwag, Reuss, and Adler who named it keratitis nummularis, keratitis maculosa, and keratitis subepithelialis centralis, respectively. Later other names were added. Jancke believes that these seemingly different diseases are manifestations of the same disease, an epidemic keratoconjunctivitis which spreads in waves at varying intervals over large areas. For all these related types he proposes the uniform term keratoconjunctivitis nummularis epidemica. (Bibliography) F. Nelson.

Jacobson, M., and Levin, N. **Epidemic keratoconjunctivitis cured through the combination of penicillin and sulfasuxidine.** New York State Jour. Med., 1945, v. 45, Sept. 15, p. 1990.

The authors publish their observations of a patient who had epidemic keratoconjunctivitis for three months. He had marked hyperemia of the palpebral and bulbar conjunctivas, tearing, photophobia, and opacities of the cornea. The patient showed remarkably fast response to combined sulfasuxidine and penicillin. Theodore M. Shapira.

Lijó Pavía, J. **Burn of the cornea and conjunctiva. How to prevent symblepharon.** Rev. Oto-Neuro-Oft., 1944, v. 19, Nov.-Dec., pp. 159-171. (See Section 5, Conjunctiva.)

Purtscher, Ernst. **Crystalline deposits in the cornea after lime burn.** Klin. M. f. Augenh., 1942, v. 108, May-June, p. 357.

The author reports one case of severe lime burn which resulted in complete destruction of the bulbar conjunctiva and corneal epithelium and almost complete degeneration of Bowman's membrane. After 10 days numerous chalky-white concretions of various sizes appeared in the corneal parenchyma of which the smaller ones were spherical, and the larger ones irregularly polygonal or quadrangular. Five weeks after the accident the perforation of the cornea increasing pain, and loss of all function led to enucleation. Histologic examination revealed that the corneal lamellae were separated by hyaline bodies which were stained faintly pink with eosin and hematoxylin. It is assumed that these formations were organic calcium compounds. (1 drawing, 1 microphotograph, references.)

F. Nelson.

Reca, Arturo. **Neuroparalytic keratitis.** Anales Argentinos de Oft., 1944, v. 5, July-Aug.-Sept., pp. 90-91.

The author discusses a case of surgical destruction of the Gasserian ganglion performed for the relief of a trigeminal neuralgia. Keratitis developed about two months after operation, with typical trophic and inflammatory reaction. Treatment consisted of warm compresses, atropine, dionine, sulfa solutions, and protein injections. No statement is made as to relief or recovery. Edward Saskin.

Rosen, E. **Megalocornea.** Amer. Jour. Opthth., 1945, v. 28, Dec., pp. 1352-1359.

Vetter, J. **Atypical cases of epidemic keratoconjunctivitis.** Klin. M. f. Augenh., 1942, v. 108, Jan.-Feb., p. 51.

The author briefly reports cases of epidemic keratoconjunctivitis in which a recurrence of the disease resulted in extensive and deep ulceration of the cornea with considerable loss of vision. In one case the vision had already been greatly diminished because of a bilateral disseminated choroiditis. (6 figures, 1 reference.) F. Nelson.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Arjona, J. **Expulsive hemorrhage.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Nov.-Dec., p. 1031.

Arjona reviews the literature and illustrates with microphotographs the vascular lesions in his own case. These show an inflammatory lymphocytic infiltration around the choroidal vessels. He concludes that the basic cause of an expulsive hemorrhage is an inflammatory or arteriosclerotic disease of the blood vessels, particularly of the ciliary vessels. The sclerosis may be a part of a general arteriosclerosis, or a purely local lesion; or it may be a sclerosis due to an undiagnosed glaucoma which leads to a vascular fragility and inability to withstand the increased vascular pressure which comes with the sudden drop of the intraocular pressure when the eyeball is opened. As a prophylactic measure the author urges careful examination for latent glaucomatous processes through provocative tests and tension curves; if discovered they should be controlled by preliminary iridectomy or miotics. When general hypertension cannot be reduced by medication, a venesection immediately before the operation is advised. After the loss of one eye from an expulsive

hemorrhage the operation on the other eye should be preceded by the administration of calcium chloride, coagulants, and vitamins C and K. The cataract extraction in such cases should be extracapsular, leaving the posterior capsule with its ciliary attachment intact. After an expulsive hemorrhage has occurred early enucleation will spare the patient unnecessary pain and the hazard of sympathetic ophthalmia. Filatov's proposal of a prophylactic and curative scleral trepanation at the equator is mentioned; the author had no experience with it, but it appears to him that it is impractical and ineffective. (3 illustrations.) Ray K. Daily.

Appel, Hans. **Bilateral hypochromia (Fuchs's heterochromia) and signs of status dysraphicus.** Klin. M. f. Augenh., 1942, v. 108, March-April, pp. 166-169.

Appel describes the eyes of a patient in whom there was a hypochromic iris complicated by postcorneal deposits, turbid aqueous, and cataract in each eye, but without synechiae. Fuchs had already mentioned that complicated heterochromia might occur in both eyes but never observed a case. Since then eight observations have been published. Appel describes another case of bilateral hypochromia observed at the Freiberg Clinic earlier. The heterochromia was complicated by glaucoma, which is not uncommon. The patient also had several manifestations of status dysraphicus, which are considered signs of early syringomyelia. (References.) F. Herbert Haessler.

Castañé Decoud, D. D'A. de. **Choroidal melanomas.** Anales Argentinos de Oft., 1944, v. 5, Oct.-Nov.-Dec., pp. 123-135.

The paper presents an evaluation of the study of 17 cases of choroidal melanoma in the past ten years. Eleven cases are discussed, with macro- and micropathology described. A well-developed table of conclusions is included. (1) This condition represents but 0.05 percent of all eye cases; (2) it occurs mainly in the fifth to seventh decades of life; (3) it is most commonly situated at the equator and anterior choroidal segment; (4) patients have lived for from two to ten years after enucleation; (5) the tumor is round, circumscribed, enveloped by melanophores, and has an almost true membrane; and (6) the most common cellular types of tumor are roundcell and fusiformcell, with an occasional mixedcell. (11 illustrations, 1 table.)

Edward Saskin.

Goedbloed, J. **Mode of inheritance in choroideremia.** Ophthalmologica, 1942, v. 104, Dec., pp. 308-315.

Three cases of choroideremia within the same family are described. From the mode of inheritance in this family as well as from the reports in the literature the author concludes that the condition shows an intermediate gonosomal heredity. Men who are affected always show a true choroideremia. Their sons are normal, but their daughters will have a pepper and salt fundus. Max Hirschfelder.

Hudelo, Guillaumat, and Maussion. **Traumatic arciform choroiditis.** Arch. d'Opht., 1945, v. 5, no. 1, p. 44.

Four cases of severe contusion of the globe in which choroidal tears resulted are reported. All four cases had in common an absence of hemorrhage and an apparent late development of the lesion. In the first case it was not possible to make a definite diagnosis until two months after the traumatism, while in the second the typical ophthal-

moscopic picture developed at the time of the second examination. In the third case the fundus appeared normal until the sixth day and the tear became visible four days later. The fourth case had an apparently normal fundus until two weeks after the injury when a typical juxtapapillary tear with degeneration of the macula was seen.

After a review of 33 cases reported in the literature the authors conclude that the lesion is not an actual tear but a traumatic necrosis of the choroid. In support of this opinion they note the late appearance of the so-called tear, the absence of the hemorrhage which would be inevitable if an actual rupture occurred, and the usual absence of edema. Phillips Thygeson.

Saggesse, D. A., and Decoud, A. C. **Conglomerate tuberculoma of the choroid.** Anales Argentinos de Oft., 1944, v. 5, July-Aug.-Sept., pp. 84-89.

In a child two and a half years of age a diagnosis of typical glioma of the left eye was made at the first examination. A yellow-white tumefaction in the vitreous cavity extended from behind the lens to the fundus. The right eye was normal. Enucleation was advised, but a month elapsed before operation. During this time the vitreous mass had became somewhat smaller and several scleral plaques or nodules had appeared. The Mantoux reaction was strongly positive.

After enucleation microscopic examination revealed typical giant and epithelioid cells, lymphocytic infiltration, and several adjacent similar choroidal follicles. Final diagnosis was tuberculoma.

Differential diagnosis requires careful ophthalmoscopy, history, serologic and radiologic study, and frequent reexaminations. The treatment of advanced cases is enucleation, provided the sclera is intact. (Bibliography.)
Edward Saskin.

Stock, W. **Chronic uveitis, its etiology and treatment.** Klin. M. f. Augenh., 1942, v. 108, May-June, p. 257.

Since Stock produced a typical nodular iritis, iridocyclitis and choroiditis in animals by introducing tubercle bacilli into the blood stream, it has been recognized that a certain number of cases of chronic uveitis in men are tuberculous in origin. However, Stock does not think that all cases of nodular chronic uveitis are tuberculous since any type of chronic infection that is spread through the blood stream can produce nodules. The clinical course of a chronic uveitis is not characteristic for one particular infection. The only data that give a certain amount of safety in diagnosing chronic uveitis are a tuberculin test and the effect of subsequent treatment. A definite focal reaction in the affected eye during the time of general reaction to one milligram of old tuberculin injected intracutaneously indicates that the eye is also suffering from an active tuberculous process. A thorough general examination of the patient is essential including fluoroscopy, sedimentation rate, dental examination and Wassermann reaction. If the patient has a normal temperature for three consecutive days the tuberculin test is made routinely. Though many patients have a positive reaction locally, a focal reaction in the eye is seen in only about 20 percent of these cases. In the latter cases X-ray treatment is administered immediately (20 percent s.e.d. = 100 r.). If after the X-ray treatment a slight ciliary injection, cloudiness of the chamber fluid and pains occur the prognosis is good. Some cases heal completely after one

treatment. If the treatment is followed by improvement but not complete recovery a second dose is given after six weeks. This interval is chosen because a delayed reaction sometimes occurs after four weeks. Stock has never seen any detrimental effect from the X-ray treatment. In more than 1,000 patients there was not a single case of roentgen cataract and often there was a definite decrease of the tension in eyes with secondary glaucoma. All cases of chronic uveitis which react this way are tuberculous. When the tuberculin reaction is negative the patient is given 10 c.c. of atophanyl intravenously daily. When the lesion responds to this treatment it is regarded as rheumatic. Atophanyl is also very helpful in sympathetic ophthalmia. Local treatment is given as usual.

There remain some patients who respond neither to irradiation nor to atophanyl but relatively well to eubasin or cibazol. In these cases one of the cocci is probably the etiologic agent. Stock does not favor sending patients to mountain sanatoria for climatic treatment. Most of his patients with severe chronic uveitis come from the Black Forest and relatively few from the northern plains. He prefers to send such patients to the sea shore.

F. Nelson.

Vidal, F., and Malbrán, J. **Studies on the chemical composition of the aqueous humor of the cat. 5. Glucose.** Arch. de Oft. de Buenos Aires, 1943, v. 18, Aug., p. 405.

The authors present tables showing the glucose content of the aqueous humor of the cat. They found a lower concentration of glucose in the plasmoid aqueous than in the primary aqueous. They confirmed the increase of glucose values in the aqueous humor after nervous excitement and the intravenous injection of adrenalin. (Bibliography.) Plinio Montalván.

Vidal, F., and Malbrán, J. **Studies on the chemical composition of the aqueous humor of the cat. 6. Ascorbic acid.** Arch. de Oft. de Buenos Aires, 1943, v. 18, Sept., pp. 454-463.

The authors present their findings concerning the ascorbic acid (vitamin-C) content of the aqueous humor of the cat, which proved to be lower than in other animals, including man. Contrary to the report of other observers, the authors found no difference between the ascorbic-acid contents in primary aqueous humor and the aqueous humor of second formation. (Bibliography.) Plinio Montalván.

8

GLAUCOMA AND OCULAR TENSION

Bloomfield, S., and Lambert, R. K. **The lability of ocular tension.** Arch. of Ophth., 1945, v. 34, Aug. pp. 83-96.

Detailed tests were conducted to determine the effect of sudden increase in arterial pressure on the intraocular pressure in both normal and glaucomatous eyes. The increase in vascular pressure was produced by immersion of the hand in cold water. The vascular and intraocular-pressure response to cervical compression was also studied. The intraocular-pressure and vascular-pressure response to simultaneous cervical compression and cold immersion was also tested. The changes in intraocular pressure encountered were not great but were of significance.

The authors concluded that the normal maintenance of intraocular pressure within an optimum range suggests the presence of a regulatory mechanism. Dysfunction of such a hemostatic

system may result in abnormal lability of intraocular pressure and may eventuate in chronic simple glaucoma. The method of cold stimulus plus cervical compression to test lability may prove of value for the earlier diagnosis of chronic simple glaucoma and the evaluation of therapeutic measures for that disease. John C. Long.

Brausewetter-Koppner, G. **Comparison between trephining (Elliot) and iridencleisis (Holth).** Klin. M. f. Augenh., 1942, May-June, v. 108, p. 303. (See Section 2, Therapeutics and operations.)

Duverger, C., and Bregeat, P. **Cataract and chronic glaucoma.** Arch. d'Opht., 1945, v. 5, no. 1, p. 3.

Cataract and chronic glaucoma may occur independently in the same eye, and there is a real danger that the symptoms of the glaucoma may be masked by the cataract which prevents recognition of optic-nerve excavation. Signs which should suggest glaucoma include abnormal dilatation of the pupil, intraocular pressure above 25 mm. Hg, and contraction of the light field, particularly on the nasal side. Distinction must be made between chronic glaucoma and temporary hypertony due to an intumescent lens. The authors recommend an inferior limbal section for cataract extraction in order to conserve the area of the upper limbus for a possible fistulizing procedure. Extracapsular extraction is recommended both for its safety and for the value of the intact posterior lens capsule in preventing the complication of vitreous prolapse into the fistula. The cataract extraction precedes the glaucoma operation, which is a slightly modified Lagrange procedure if the cataract is mature and if the visual field is good and the hypertony can be controlled by miotics. The glaucoma operation is done first if the visual field is markedly contracted or the hypertony does not respond to miotics.

Phillips Thygeson.

Gradle, H. S. **Fundamental ideas in surgical treatment of glaucoma.** Arch. Chilenos de Oft., 1945, v. 1, Jan.-Feb., pp. 5-11.

Practically all the measures taken to lower intraocular hypertension attain their purpose by establishing drainage of the aqueous humor. This may be done by restoring the normal drainage channel, opening new intraocular channels, or establishing new extraocular pathways for carrying off the aqueous. Each operation has definite indications. The results of surgical intervention depend on the oculist's diagnostic skill, and on his knowledge and understanding of pathologic changes and of the modus operandi of the various procedures, as well as their operative technique. In a general way, it may be said that 95 percent of cases of glaucoma can be controlled provided that they are not seen too late and that a judicious surgical plan is followed.

W. H. Crisp.

Lehrfeld, L. **Revaluation of Herbert's flap operation for glaucoma.** Arch. of Ophth., 1945, v. 34, Sept., pp. 191-194.

Herbert's original trapdoor or flap operation, devised initially for absolute glaucoma, had, as its basic principle, the drainage of fluid from the interior of the eyeball through an opening in the sclera, in the anterior segment, to the subconjunctival space. Using a narrow Graefe knife, he made an incision in the sclera 2 mm. from the corneal margin in the lower outer

quadrant of the globe. From the two ends of this small incision, two shorter forward cuts were made to the limbus by turning the edge of the same narrow blade forward and sawing carefully to avoid puncturing the iris, in the emptied anterior chamber. He thus created a small rectangular flap or tongue of corneoscleral tissue, which was cut subconjunctivally with its base at the limbus.

Lehrfeld still advises enucleation of all painful blind eyes associated with increased intraocular pressure, but when the patient refuses enucleation, this operation may be tried. He has operated upon the eyes of seven patients of this nature with quite satisfactory results.

If the origin of acute glaucoma is in the vitreous-chamber segment, it seems logical that the new exit of fluids should be made in the silent portion of the eyeball, rather than at the corneal margin. The same holds true for chronic simple glaucoma which has as its basic pathologic conditions arteriosclerosis and fibrosis of the tissues of the eyeball. If one holds to the theory that the canal of Schlemm is so sclerosed and fibrotic that it no longer serves as exit for these fluids then the new exit for these fluids should not be in the obstructed angle, but in the silent areas of the eyeball.

Herbert originally made his anterior sclerotomy 1.5 mm. from the limbus. Later he increased the distance to 2, 3, and 4 mm. Lehrfeld's contribution to the Herbert operation is a further shifting of the exit in the sclera 4 to 8 mm. from the limbus, producing a trapdoor in the region of the eye corresponding to the location of the ciliary body and immediately beyond.

The operation can be repeated at different locations should increased ocular tension return. R. W. Danielson.

Lijó Pavía, J. **Anterior hemorrhagic glaucoma.** Rev. Oto-Neuro-Oft., 1944, v. 19, Oct., pp. 134-140.

This diagnosis is reserved for the secondary glaucoma that follows partial or total occlusion of the central retinal vein or its tributaries, which is associated with rubeosis iridis; which accompanies diabetes with hemorrhages; and which follows massive vitreous or retinal hemorrhage. The author quotes the opinions of other writers as to what data are necessary for such a diagnosis.

The case of a young adult is presented who suffered a trauma to his left eye some years earlier, following which a cataract developed. Vision was reduced to light perception. After a long period of quiet, he suddenly experienced severe pain in the same eye. Examination revealed corneal edema, hyphema of 4 mm., a dilated pupil, and a tension of 80 mm. (Schiøtz). Under pilocarpine 3 percent, and general care, the tension was brought to normal in one month, with no recurrence of corneal edema, and a recession of the hyphema to 2 mm. Rubeosis iridis was also present. After a second month of treatment the hyphema was completely absorbed. The author concludes that anterior hemorrhagic glaucoma is due to mechanical obstruction of the iris angle, since miosis hastens absorption of the attendant hyphema and restores a normal ocular tension. (3 retinographs, references.)

Edward Saskin.

Radnet, Magda. **Eye findings in Cushing's disease.** Ophthalmologica, 1942, v. 104, Dec., pp. 301-307. (See Section 17, Systemic diseases and parasites.)

Stocker, F. W. **Response of chronic simple glaucoma to treatment with**

cyclodiathermy puncture. Arch. of Ophth., 1945, v. 34, Sept., pp. 181-186.

Two types of diathermic treatment have been recommended for glaucoma. Weve, followed by Amsler, was first to use the surface electrode. The perforating type, called cyclodiathermy puncture, was introduced by A. Vogt.

In the beginning Stocker used cyclodiathermy puncture only in desperate cases of glaucoma which had been unsuccessfully treated by several of the various surgical procedures. However, as the author's own experience grew he became more and more convinced that the technique of cyclodiathermy puncture could be so refined as practically to exclude most of the dreaded unfavorable side and after effects. He therefore treated with cyclodiathermy puncture a group of Negroes suffering from chronic simple glaucoma, who had not been previously subjected to any other operation and who ordinarily respond poorly to filtering operations.

Vogt's original idea was to destroy the ciliary body with its processes directly with the coagulating diathermic current. However, when the punctures were applied near the limbus where they reached the corona ciliaris, there was too much reaction, and even necrosis of the cornea occurred. It was found that when cyclodiathermy puncture was applied farther back, to the pars plana of the ciliary body, an adequate lowering of the tension resulted. It must be assumed that by destroying the blood vessels, which are supplied by the long posterior ciliary arteries and reach the corona ciliaris by passing through the pars plana, the circulation of the corona ciliaris becomes impaired to a point at which degeneration and atrophy results. This obviously should ultimately lead to a decrease in the production of intraocular fluid.

The author recommends close adherence to the technique as outlined. He says, "Vogt's needle, 0.5 mm. long and 0.18 mm. in diameter, or the shortest type of Kronfeld needle may be satisfactory. More recently I have been using exclusively a needle that has been made according to my own suggestions. It is better insulated and may be recommended. Very little current should be used. Vogt used to recommend 60 milliamperes. However, I found that it was not practical to rely on a milliampere meter and that it was necessary to determine at the beginning of the operation how much current is necessary just to produce coagulation on the surface of the sclera. Usually the Walker machine is set between 15 and 20.

"The question then arises how many punctures should be made and how large an area has to be covered. An area beginning from 2.5 to 3 mm. from the limbus to the ora serrata should be covered. Therefore, on the inner side, the punctures must extend back somewhat farther than the insertion of the internal rectus, on the inferior side just about beyond the insertion of the inferior rectus, and the same distance on the external side. If the punctures are applied to the upper part of the globe they should not extend quite as far as the insertion of the superior rectus. The coagulation needle should be left in the sclera a little longer than one second. I count 1, 2, 3 during the procedure. On the count of 1, I introduce the needle, on 3 I remove it. The needle should be under current throughout the procedure. Usually somewhat more than one third of the inferior circumference is treated. We tried to establish a relation between the number of millimeters of mercury of tension and the

number of punctures. We are tentatively following the formula: number of millimeters of mercury of tension plus 30 equals the number of punctures required. However, never more than 80 punctures should be applied in chronic simple glaucoma."

Cyclodiathermy puncture, in 16 cases of chronic simple glaucoma, has proved to be a harmless procedure, as deleterious complications have not developed in any case. Its influence on the tension and the general course of the disease has been generally beneficial. The lowering of the tension has been of long duration.

Cyclodiathermy puncture has certain definite advantages over other operations used for glaucoma simplex. It seems to work regardless of the type of glaucoma. No late infection is to be feared. No tendency toward stimulating the development of opacities of the lens can be demonstrated. No rapid deterioration after the operation in advanced cases, as frequently seen in some of the other procedures, occurs. It therefore may be applied safely in all stages of chronic simple glaucoma.

As shown in this study, cyclodiathermy puncture is effective also for the Negro and may well become the method of choice for the treatment of the severe disease in this race. A careful observation of the technique as outlined is essential.

A discussion of this paper appears in Arch. of Ophth., 1945, v. 34, p. 346.

R. W. Danielson.

PAN-AMERICAN NOTES

Edited by Dr. M. Uribe Troncoso
500 West End Avenue, New York

Communications should reach the editor by the twelfth of the month.

Miscellaneous

Chile: New ophthalmological journal. We have received the first four issues of the "Archivos Chilenos de Oftalmologia." a bi-monthly journal published under the editorship of well-known ophthalmologists in Chile. The director is Dr. S. Barrenechea, who has as honorary editors Prof. C. Charlin, director of the University Eye Clinic, and Profs. Martini, Espildora Luque, and Thierry.

Each number contains, besides original articles, the proceedings of the Chile Ophthalmological Society, abstracts, book reviews, and other material.

We wish a long life and complete success to the new journal.

Mexico: The Association for Prevention of Blindness in Mexico has issued a volume of the proceedings of the annual convention held by the association this year. It is a large and well-printed book with many illustrations. There is an introductory statistical review of the ophthalmologic work done in the hospital of the association during the year 1944. The staff includes 12 ophthalmologists, many internes, and nurses. There is also a large out-patient department. The number of operations performed in the hospital during 1944 was 670, a few more than those of the previous year. Next to cataract operations the largest number of operations was for pterygium. This fact illustrates the frequency of this disease in the semi-tropical altitude of Mexico.

In addition to this report the book includes 17 interesting papers. To be mentioned are one dealing with conjunctival involvement of onchocercosis, one with intraocular cysticercus, and others with traumatisms of the skull, contact lenses, and angioscotometry. Three papers were contributed by American ophthalmologists, one by Dr. Conrad Berens and C. E. Kerby, another by Dr. Daniel B. Kirby, and the third by Dr. George Guibor. The volume ends with necrological articles and the pictures of Dr. Rafael Silva and Dr. Sanford R. Gifford, of Chicago, outlining the careers and merits of these distinguished ophthalmologists. The book is a worthy addition to ophthalmologic literature in Mexico.

The last numbers (March and August, 1945) of the "Boletin del Hospital Oftalmologico de N.S. de la Luz," of Mexico, contains interesting articles on onchocercosis, clinical applications of angioscotometry, a new method of suture for cataract operations, and a short article on ocular leprosy.

The National Society for the Prevention of Blindness participated in the Pan-American Congress of Ophthalmology. Mrs. Eleanor Brown Merrill, the executive director, accepted an invitation to participate in this Congress and attended the meetings in the last week of November, 1945. She presented a paper on the subject: "How medical and lay coöperation may be used in national prevention of blindness programs."

In conjunction with the Congress, a special exhibit had been prepared in Spanish, presenting in five large oil paintings the following aspects of the prevention of blindness: (1) How drops at birth save babies' eyes; (2) Preschool eye care; (3) Need to help establish sight-saving classes; (4) Eye health and safety in industry; and (5) Periodic check-up of the eyes past mid-life. In addition, a smaller exhibit has been prepared on the use of traveling eye clinics for rural patients. These units have been presented to the Pan-American Congress with the thought that, following the meetings, they will be circulated throughout South and Central American countries at the national medical, social work, and educational meetings.

Obituaries

Prof. Carlos Charlin. The distinguished professor of ophthalmology of the University of Chile, Dr. Carlos Charlin, died suddenly on August 31, 1945. The funeral was held in the hall of the medical school, where representatives from the Institution, from San Salvador Hospital, from the Chile Ophthalmological Society, and from other associations read addresses outlining the scientific and professional career of Dr. Charlin. The "Archivos Chilenos de Oftalmologia" published a special number in his honor containing a list of his papers and of the nine books on ophthalmology he issued during his long and fruitful life. Professor Charlin was considered the outstanding ophthalmologist of Chile for many years.

Dr. Joaquin Tejeda, a member of the staff of the Hospital of N.S. de la Luz passed away in Mexico, in June, 1945. He was the ophthalmologist in charge of the eye department in the Hospital and Institute for Leprosy near Mexico City. His premature death was a matter of great regret to his colleagues.

NEWS ITEMS

Edited by DR. DONALD J. LYLE
904 Carew Tower, Cincinnati 2

News items should reach the editor by the twelfth of the month.

DEATHS

Dr. William S. Ankenbrock, Indianapolis, Indiana, died September 28, 1945, aged 49 years.

Dr. Fletcher L. Crocker, Pontiac, Illinois, died August 31, 1945, aged 79 years.

Dr. Edward A. Dignam, Rockville, Connecticut, died August 26, 1945, aged 48 years.

Dr. Albert D. Frost, Columbus, Ohio, died November, 15, 1945, aged 56 years.

Dr. William J. Harkins, Quincy, Massachusetts, died August 25, 1945, aged 59 years.

Dr. Nelson K. Hopkins, Arlington, South Dakota, died July 25, 1945, aged 63 years.

Dr. James W. Jervey, Greenville, South Carolina, died November 1, 1945, aged 71 years.

Dr. William L. Kenney, Saint Joseph, Missouri, died August 11, 1945, aged 72 years.

Dr. Samuel A. Miller, Longview, Texas, died August 28, 1945, aged 78 years.

Dr. Samuel W. S. Toms, Nyack, New York, died August 22, 1945, aged 83 years.

Dr. George G. Van Mater, Peru, Indiana, died August 28, 1945, aged 82 years.

Dr. James W. Wallace, Aledo, Illinois, died August 26, 1945, aged 64 years.

Dr. Benjamin B. Wechsler, Pittsburgh, Pennsylvania, died August 17, 1945, aged 66 years.

Dr. Joseph B. Workman, Ware Shoals, South Carolina, died September 20, 1945, aged 67 years.

MISCELLANEOUS

The Department of Ophthalmology, Northwestern University Medical School, has received an additional gift of $4,000 to the Sanford R. Gifford Memorial Fund from Mr. Bernard Spero, president of the House of Vision, Chicago. It is proposed to use this sum to establish a fellowship in research and teaching of refraction and allied subjects to young ophthalmologists.

A change in the examination dates of the American Board of Ophthalmology has been announced. The examination originally scheduled to be held in Los Angeles, January 28th-31st has been changed to San Francisco, June 22d-25th. Other examinations will be: New York, about April 14-19th, and Chicago, October 9th-12th. A new ruling requires that previously accepted candidates mail their lists of surgery to the Board office at least 60 days prior to their examination. All new applicants are now required to send their lists with their application. Dr. S. Judd Beach, Portland, Maine, is secretary-treasurer of the Board.

Washington University School of Medicine in Saint Louis announces a four-week intensive refresher course in ophthalmology from June 3 through June 29, 1946. The 131 hours of didactic lectures will cover the important phases of ophthalmology. The course is designed primarily for the returning veteran, but should also serve as an excellent review for candidates for the examination by the American Board of Ophthalmology. Tuition fee: $200.00. An outline of the course as well as more detailed information will be sent on request. All applications or inquiries should be addressed to Dr. Richard G. Scobee, Director of Graduate Training in Ophthalmology, Washington University School of Medicine, 640 South Kingshighway, Saint Louis 10, Missouri.

Emory University will hold an ophthalmological seminary honoring the memory of Dr. Abner Wellborn Calhoun, April 4th to 6th. Guest lecturers will be Drs. William Benedict, John Dunnington, Parker Heath, Walter Lillie, Derrick Vail, and Frank Walsh. All members of the ophthalmological profession are cordially invited as guests of Emory University. Make reservations early at the Atlanta Biltmore.

The Oregon Academy of Ophthalmology and Otolaryngology will hold its sixth annual spring postgraduate course in ophthalmology and otolaryngology in Portland, April 15 to 20, 1946. Among the guest speakers will be Dr. Algernon B. Reese, professor of ophthalmology at Columbia University, and Dr. Gabriel Tucker, professor of bronchoscopy and laryngology at University of Pennsylvania Graduate School, Philadelphia.

The third ophthalmologist's office-assistant's course in fundamental optics was held at the Pember-Nuzum Clinic, Janesville, Wisconsin, from February 2d to 16th. Among the participants in giving the course were Dr. Aubrey H. Pember, Selma Weiskopf, Austin B. Belgard, and Ralph Lowrey.

The Gill Memorial Eye, Ear, and Throat Hospital will hold its nineteenth annual spring graduate course in ophthalmology, otology, rhinology, laryngology, facio-maxillary surgery, and bronchoscopy and esophagoscopy, from April

1st to 6th. The courses in ophthalmology will be conducted by Drs. Charles A. Perera, F. Philip Koch, Edmund B. Spaeth, George P. Guibor, Merrill J. King, William F. Hughes, Jr., Frank Payne, and Isaac S. Tassman.

Societies

The guest speaker of the October dinner meeting of the Cleveland Ophthalmological Club was Dr. John E. L. Keyes, who spoke on "The present status of penicillin in ophthalmology."

Dr. Martin Cohen, professor of ophthalmology in the Graduate School of Columbia University, was the speaker at the December dinner meeting of the Cleveland Ophthalmological Club. Dr. Cohen spoke on "Fundus changes observed in nephritis, diabetes, and hypertension." His talk was illustrated with many beautiful lantern slides. Because of his valuable contribution to ophthalmology, Dr. Cohen was made an honorary member of the Cleveland Ophthalmological Club.

The following officers were elected by the Section on Ophthalmology, College of Physicians of Philadelphia: Dr. Burton Chance, chairman; and Dr. George F. J. Kelly, clerk. Meetings are held the third Thursday of every month from October to April.

The Research Study Club of Los Angeles conducted its fifteenth annual midwinter postgraduate clinical assembly in ophthalmology and otolaryngology from January 21st to February 1st. Guest speakers included Dr. Meyer Wiener, Dr. Frederick C. Cordes, Dr. Herbert M. Evans, and Irving B. Lueck, B.S.

At the January 22d meeting of the Milwaukee Oto-Ophthalmic Society Dr. Avery D. Prangen presented a paper on "Some clinical aspects of refraction."

Personals

Dr. Joseph I. Pascal has just returned from South America where he attended the Pan-American Congress of Ophthalmology held in Montevideo, Uruguay, the week of November 26 to December 2, 1945. Dr. Pascal was a delegate from the New York Society for Clinical Ophthalmology and at the scientific session of the Congress read a paper on "An accommodative unit in corrected ametropia."

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